

**EVALUATION OF METHODS OF TERMINATION OF PREGNANCY
IN SECOND TRIMESTER WITH HISTOPATHOLOGICAL
CHANGES IN PLACENTA**

**THESIS
FOR MASTER OF SURGERY
(OBSTETRICS & GYNAECOLOGY)**

**BUNDELKHAND UNIVERSITY,
JHANSI.**

8486 ✓

1983

RENUKA MISRA

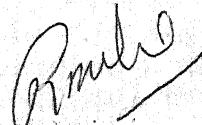
Department of Obstetrics & Gynaecology
M.L.B. Medical College, Jhansi

3

CERTIFICATE

This is to certify that the work related to "EVALUATION OF METHODS OF TERMINATION OF PREGNANCY IN SECOND TRIMESTER WITH HISTOPATHOLOGICAL STUDY OF PLACENTA" which is being submitted for the M.S. (Obst. & Gyna.) thesis was done by Dr. Renuka Misra in the Department of Obstetrics and Gynaecology.

The candidate has fulfilled the necessary stay in the department according to regulations of the University.



(Dr. Renuka)
M.S. D.G.O.,
PROF. & Head,
Dept. of Obstetrics
and Gynaecology,
M.L.B. Medical College,
Jhansi, (U.P.)

CERTIFICATE

This is to certify that the work related to "EVALUATION OF METHODS OF DETERMINATION OF PREGNANCY IN SECOND TRIMESTER WITH HISTOPATHOLOGICAL STUDY OF PLACENTA", which is being submitted for the M.S (Obst. & Gyne.) thesis was done by Dr. Ranjita Niara, under my personal supervision and guidance. The techniques and methods described were undertaken by the candidate herself and the observations recorded have been periodically checked by me.

Sunita Arora

(Dr. Sunita Arora,
M.B.,
Reader in the Deptt.
of Obstetrics & Gynaecology,
M.L.B. Medical College,
Jhansi (U.P.)

CERTIFICATE

This is to certify that the work related to " EVALUATION OF METHODS OF TERMINATION OF PREGNANCY IN SECOND TRIMESTER WITH HISTOPATHOLOGICAL STUDY OF PREGNANCY" WHICH is being submitted for the M.S. (Obst. & Gyne.) thesis was done by Dr. Renuka Mital under my personal supervision and guidance. The techniques and methods described were undertaken by the candidate herself and the observations recorded have been periodically checked by me.

ans, h

(V.P. Mital)
M.B. (D.M.)
Prof. & Head,
Dept. of Pathology,
M.L.B. Medical College,
Jabalpur (U.P.)



ACKNOWLEDGEMENT

I am grateful to Dr.R.Mitra, M.S.D.G.O., Professor and Head of the Department of Obstetrics and Gynaecology, M.L.B. Medical College, Jhansi for the immense help she has extended to me willingly in the study of this subject.

It gives me immense pleasure to record here my sincere gratitude to my internal guide Dr.Sunita Arora, M.S., Reader in the Department of Obstetrics and Gynaecology, whose able guidance encouragement and constant help could make this work possible.

I am most deeply indebted to Dr.V.P.Mital, Professor and Head of the department of Pathology, M.L.B. Medical College, Jhansi for his able guidance in study of placenta.

I take this opportunity to thanks all the other staff members of M.L.B. Medical College, Jhansi and the technician of Pathology Department for their active and unflinching co-operation.

Renuka

(RENUKA MISRA)

C O N T E N T S

1.	Introduction	..... 1	..... 2
2.	Review of Literature	..... 3	..... 21
3.	Material and Method	..... 22	..... 28
4.	Observations	..... 29	..... 54
5.	Discussions	..... 55	..... 75
6.	Conclusions	..... 76	..... 79

INTRODUCTION

INTRODUCTION

The termination of pregnancy is one of the oldest and commonest form of pregnancy control. No human community has ever shown a marked fall in the birth rate without significant dependence on induced abortion, as contraceptive measures alone are unlikely to provide a significant measure of population control.

Liberalisation of abortion laws and need of family planning have led to increased demand for termination of pregnancy throughout the world. While termination of pregnancy in first trimester by suction evacuation and D & C is easy, it is not so in second trimester. The demand for second trimester termination of pregnancy continues to be a common feature in the cities where many unmarried and primiparous young girls seek help. The reasons are, firstly, the late diagnosis of the pregnancy due to a false sense of modesty, guilt and shame which prevents them from seeking help.

Secondly, due to ignorance of the safety, reliability and legality of first trimester termination of pregnancy and lastly because of social stigma of unwanted pregnancies, many young girls postpone the decision till the second trimester of pregnancy. Another factor, which tends to increase the demand is the recent advances in prenatal diagnosis of foetal malformation.

With the advance of pregnancy abortion becomes difficult and necessitates labour contractions. There are several methods of starting labour in the second and third trimester the ultimate aim is the most physiologic delivery of the foetus to ensure the safety of mother. Various procedures have been tried through various routes for best possible results and safety and certain methods have evolved which are believed to be the standard method today. But since most require a certain amount of technical skill they are not still the ideal method today. Hence, efforts are therefore, being made to find out the method which is technically simple, safe and effective. In the present work a comparative study and evaluation of different methods of induction has been done. Efficacy of particular method is judged by comparing the induction abortion interval and maternal complications.

My series is small and fallacies many, yet I hope this study has given me some opportunity of understanding the subject.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

of all the methods of termination of pregnancy in second trimester abdominal hysterectomy must be one of the easiest operation in the whole field of gynaecology and one in which the control of blood loss is total, but during past decade it has lost much of its popularity as other methods are being preferred in terms of avoiding scar, anaesthetic and operative complications and hospital stay. One of the advantage that is still there is the aminibility of the woman to accept tubectomy simultaneously with very little motivation.

In subsequent pregnancies complications due to scar are emphasized by Clow and Crompton (1983). As with a classical Caesarian section, there is a distinct possibility of a scar dehiscence or rupture occurring in any future pregnancy. Russel and Hewlett (1969) found radiographic evidence of deformity at the scar site in nearly 50 per cent of the cases investigated.

In a study of 50 cases carried out by Russel et al (1969) of patients who had hysterectomy for therapeutic termination of pregnancy fifty two per cent showed a normal Hysteroogram. Forty eight percent showed some deformity at the scar.

Although much work has been done on induction of abortion with hypertonic saline, the method is still viewed with apprehension with regard to its safety. Since the time it was first introduced by Abrual (1934 as quoted by Agarwal Savitro et al 1979) the method of termination of pregnancy by hypertonic saline has been extensively used by a number of workers in India and abroad - Wagner et al (1962), Ruttner (1966).

While most of the workers - Fuchs (1967), Schiffer (1966) and Mackenzie (1971) as quoted from Agarwal, Savitri et al (1979) used abdominal route for instillation of hypertonic saline others Ruttner (1966) claimed equal success by injecting it through vaginal route. Saline of different strengths has been used by different workers. Majority (100) workers used 20% saline (Wagner et al (1962), Mackenzie (1971)). Except a few workers the amount of saline instilled was restricted to a maximum limit of 200 ml by majority of workers. Cameron and Bayan (1966) recorded 2 deaths due to massive cerebral infarction following instillation of saline.

Chapo (1963) and Coworkers believe that the hypertonic saline solution triggers the evaluation of uterine activity and abortion by increasing the uterine volume : plasma progesterone (V:P ratio).

Bangtesson and Csapo showed in 1962 that oxytocin had very little effect on midtrimester ; after saline injections the uterus becomes much more sensitive to oxytocin. Wagner and colleagues (1962) and Schiffer (1966) investigated the effect of small dosages of oxytocin administered 24 hours after saline induced abortion and found that it had no effect. Craft and Musa (1971) were able to demonstrate oxytocin effectiveness when the patients were aborted with intraamniotic instillation of urea. The study of Laurensen et al (1973) showed a significant faster mean abortion time when large dosage of oxytocin were given immediately after saline instillation.

oxytocin admin- stration in rel- ation to saline instillation	No. of patients	Mean abortion time in hours	S.D.	SEM
no oxytocin	262	35.6	± 14.18	.997
oxytocin started within 6 hours	221	20.4	± 8.08	.543
oxytocin is started between 6 and 24 hrs.	99	28.8	± 9.16	.925
oxytocin started after 24 hrs.	160	45.2	± 17.19	1.385
Total	682	31.7		

This analysis showed that abortion time was significantly lowered in patients who received oxytocin within 2 hours of saline instillation.

Various complications like post abortal fever, pelvic infection, retained placenta, maternal mortality have been reported by various workers. Wagner (1962) reported an incidence of 2.3% of pelvic infection which included the case of pelvic abscess, one case of paralytic ileus.

Post abortal fever was reported by Wagner et al. (1962), Weingold (1965) Karcanyi (1971) as quoted from Agarwal Savitri et al (1979) as 7.5%, 11.1% and 6.8% respectively. In the series of Agarwal Savitri (1979) the incidence for the same was noticed as 3.7% which responded to simple antipyretic measures.

Deaths reported by various authors were definitely either due to faulty technique adopted or wrong selection of cases with systemic disorders Haschizumi (1950) as quoted from Agarwal Savitri et al (1979) from Japan. These were subsequently reviewed by Nagastuma (1968) and causes were attributed to (i) Technical failure which represented infection or direct injection into the blood stream or myometrium.

(ii) Aggravation of general complications already present due to improper evaluation of the illness. Pathak (1968) reported death in a known diabetic and with instillation of excessive hypertonic saline. Cameron Dayan (1966) reported death in which the technique was practised under G/A which is a disadvantage where the side effects cannot be elicited as compared to a fully conscious patients, so it is in fact that selection of cases and proper technique of administration of hypertonic saline is very important in order to avoid serious complications and side effects. Instillation of hypertonic saline has many advantages. It may be preferred to hysterotomy in as much as avoiding uterine scar, anaesthetic and operative complications and length of hospital stay.

Intrauterine injections via the cervix of soapy pastes actus/utus type have been used since 1930's and Barnes (1971) as quoted by Green half (1971) enthusiastically reported a success rate of 80%.

Amniocentesis and the injection of 5% dextrose had been used with great success by Brossat (1958), Lewis et al (1969) but there remains the potential hazard of intrauterine infection and possibility of thromboembolic complications if a part of injection is made intravenously.

Author	No. of pts.	Dose of oxytocin	Mean I/A interval (hrs.)	Failure Rate	Mean Hospital stay
Craft and Musa	15	38 mU/min.	26.43	None	4
Rand and associates	15	278 mU/min.	18.80	None	4
Greenhalf	7	None	49.60	None	not recorded
Smith and Newton	50	Rectal after 24 hrs.	4800	10	5.5
	50	app. 265	22.79	5	not recorded

Hyperosmolar urea has been shown to be an effective midtrimester abortifacient and there is some evidence to suggest that with respect to safety it may have distinct advantages when compared to hypertonic saline. Whereas urea is considered to be extremely safe as an abortifacient agent. Certain complications comparable to that of saline have been documented.

Injection of urea into the myometrium just as saline is proved to result in muscle necrosis, as Gamaley et al (1976) demonstrated in Rhesus monkeys. Recent literature also indicates the potentiality for coagulation defects in urea induced abortions. Burnett et al (1975) have demonstrated a fall in fibrinogen concentration approximately 15% after 6 hrs. of instillation of urea and lowest level recorded is 145 mgms.

The mean platelet count showed a drop of approximately 18% and the fibrinogen fibrin degradation products (FDP) were significantly elevated in 36% of patients.

MacKenzie and Linda (1975) reported changes consistent with intravascular coagulation (Rise in F.D.P., fall in plasma fibrinogen and reduction in platelet count) in patients aborted with prostaglandin in combination with urea.

The theoretical foundation for the use of prostaglandins in the induction of early and late abortions in human was the work on the induction of labour. Unlike oxytocin prostaglandins were found to have a stimulating effect on the myometrium in early as well as late pregnancies. Bygdeman et al (1967) Karim and Millier (1970) identified significant levels of PGF₂α and PGF₂ in human amniotic fluid, in the decidua and in peripheral maternal circulation not only at the time of full term spontaneous labour but also during spontaneous abortion. Karim & Pilshie (1970) reported a series of 15 patients who received a constant infusion of PGF₂α (15mg/min). Abortion was successful in 14 and complete in 13. Uterine contractions were monitored in 10 pts., which usually revealed an initial hypertension which occurred 1-3 min. after beginning the infusion and lasted 10-15 min until labour became established.

The only side effects noted were diarrhoea in 7 women, 3 of whom also vomited. Gestation ages were 9-22 weeks. The simultaneous publication from Stockholm by Roth-Brandstål et al (1970) concerning the use of prostaglandins to induce abortions in 11 women between the thirteenth and eighteenth weeks of pregnancy I/V infusions in various dose rate were used in 7 pts. and S/C injections in 4. Both methods of administration caused an initial hypertonic uterine response with ultimate labour but were maintained long enough to induce abortion in 3 of 11 patients. Dose rates were regulated to invoke a uterine response without causing side effects.

In less than 2 years since these initial publications numerous clinical studies have been reported Byggman and Miquist (1971), Karim (1971), Bahkay (1971), Calliespie (1971) Karim and Pilshie (1970), Kaufman et al (1971) : once again Karim had the most extensive experience. The success rate was 93% representing the most efficacious results thus far accomplished by any investigator.

Byggman and Miquists (1971) cumulated experience with I/V PGF_{2α} is summarized below. The infusion was given at a constant rate 25 - 100 ugms/min. and titrated against side effects. With a mean total dose of 30 mg. 94% of the early pregnancy (8 weeks or less) aborted. However only 10-30% of later pregnancies

Results of cumulative experience using I/V $\text{PGF}_2\alpha$
for therapeutic abortion.

(Byggeman and Miquist 1971)

Table

Preg. (Wks.)	No. of cases	Average infusion time (hrs.)	Total dose (mg.)	Complete or partial
8	22	7.6	31.1	20
9- 12	19	13.4	61.8	6
13 - 15	13	13.4	70.9	2
16	10	13.9	66.7	2

Miquist and Byggeman found that significant dysmenorrhoeic pain occurred in 50% of cases at a dose of 50 mg/min. whereas only 12% of cases had nausea or diarrhoea. At a rate of 75 mg/min. 60% complained of dysmenorrhoeic pain and 30% had nausea or diarrhoea. At 100 mgms/min. all subject developed significant dysmenorrhoeic complaints and it was concluded that the dose dysmenorrhoeic range which stimulates effective uterine contractions but does not cause generalized side effects is rather limited.

The lack of adequate efficacy and occurrence of clinically unacceptable side effects caused the investigators to turn to other possible routes of administration.

12

Karim noted uterine stimulation at term by using oral PGF_{2α} but found that large amounts required to stimulate the early pregnancy uterus caused unacceptable gastrointestinal side effects. Workshop conference on prostaglandins (1971). Miquist and Bygdeman (1970) found that subcutaneous and intramuscular routes yielded a uterine response but caused excessive local pain. The only other route that showed promise was extraovular vaginal and intraamniotic. They investigated the extraovular route because of their limited success with more advanced pregnancies. It was hoped that the prostaglandins would have a local effect, thus giving maximum response with minimum side effects.

The intraamniotic route had been tried by Miquist et al (1968). Using doses in the range of 75ug/min in mid pregnancy uterus they noted no appreciable side effect on uterine contractility using higher dosages 5-15 mg PGF_{2α} administered at intervals of 3- 14 hrs depending on contractile response. Bygdeman et al (1971) noted physiological contractions within 60 min. and nine patients aborted, 4 completely. The drug was injected through a transabdominal intraamniotic catheter which was left in side to also allow recording of uterine contractions.

There is still great need for an easily available drug which will constantly induce second trimester abortion with certainty without ending up in incomplete expulsion of the products of conception or serious complications.

In recent years the role of Steroids in myometrial contractility and in labour has been under intense study. Nati et al (1973) could provoke premature labour in ewes by intramuscular injection of Betamethasone. Craft et al (1975) successfully induced labour by betamethasone administered intramuscularly. Murphy (1973) indicated a relationship between cortisol levels and onset of uterine contractility in humans. Mrosu et al (1976) employed intraamniotic injection of 500 mg. cortisol to induce labour in prolonged gestation.

Parikh (1978) in his series of 15 cases tried 400 μ g of esofolin - with 10 units of syntocinon. 13 cases (86.7%) aborted. The induction abortion interval was found to be 62 hrs. and 41 min. There was no incomplete abortion and failure was seen in 2 cases (13.3%).

The mechanism of cortisol induced labour is not fully understood. In the sheep Liggins (1972) has proposed that the sheep cortisol shower released by foetal lamb near term increases the levels of placental prostaglandins P_2 as well as oestrogens.

The increasing concentration of both these agents are thought to prime the uterus increasing its sensation to endogenous oxytocin. Whether a similar mechanism is applicable to human remains to be defined.

Midtrimester pregnancy termination was tried with intraamniotic distilled water by Rastogi .K. et al (1981) in 100 cases. The amount of distilled water that could be instilled had no relation with the period of gestation, but had a very significant relation to outcome. The procedure was 100% effective when more than 100 c.c distilled water was injected.

The time of onset of uterine contractions varied from 0-12 hours in 5 cases, 12 - 25 hours in 25 cases, 24 - 48 hours in 70 cases. Thus in 70% cases contraction started in 24-48 hrs. The instillation abortion interval varied from 24-48 hours in 15 cases, 49-72 hours in 45 cases, 72-96 hours in 40 cases. In 10 cases, oxytocin drip was started and in 5 cases ARM was done. Only in 5 cases evacuation was done. Seventeen cases failed to abort and thus the success rate was 63%.

Complications reported excessive bleeding due to cervical tear, 1 case (1%) pyrexia, in 5 cases (5%) amniotic fluid embolism with mortality 1% and retained placenta 5 cases (5%).

The story behind the development of Japanese method begins with opening of Japanese doors to western civilization some 100 years ago, Japan learned modern medicine largely from Germany, and before the war German text books were generally used.. Naturally the techniques available for inducing labour at term were those which had been developed in Germany. These included rubber instrument insertion, such as Bouies between the membrane and the uterine well known as Krauses Method (1855 as quoted from Manabe, 1969) and introduction through the cervix of an inflated balloon, eg. the Calpeurynter of Carl Braun (1851) as quoted from Manabe (1969) and metreurynter of Champetier de Riba (1887 as quoted from Manabe 1969). Although American medical practice began to replace the methods after world war II, the time honoured use of rubber instruments persisted.

Manabe, Y (1969) has reported upon the rise in uterine activity in Metreurynter bougie induced abortion in midtrimester extravular placement of rubber tube has been advocated by George (1983) as quoted from Misra, J. et al (1981) for mid trimester abortion). Prolonged abortion time being a major concern by Catheters a combined method of catheter and prostaglandins was advocated by Rajan et al (1979) Grand (1978) as quoted from Misra et al (1981) has used extravular rubber catheter only for termination of pregnancy with success.

The events of labour after induction by this method do not differ at all from those at term, so long the delivery is completed quickly without infectious complication and if foetus is near the middle of the 5th month it is normally delivered alive. Most foetuses however die shortly after delivery if foetal age is less than the middle of 7th month.

There seems no functional difference between Japanese methods and others including the use of hypertonic solutions. The common denominator is stimulation of the uterus in broad sense. Stretch is concentrated in the cervical region with metrurynter, while it is more widely spread from cervix to fundus in other methods. This suggests a lack of regional speciality for stimulation.

When mechanical stimulation is applied to the uterus the possibility of reflex release of oxytocin during treatment cannot be eliminated. It is known however that sensitivity of the uterus to the oxytocin is quite low at midtrimester and that it does not reach to physiological doses. Thus even if some oxytocin is released during treatment it can hardly be considered sufficient to start labour contractions. This has already been proved in metrurynter induced abortions. When the metrurynter is not used oxytocin treatment fails to start labour at mid pregnancy.

The study of Japanese methods indicates that placental dysfunction is not the cause of rise in uterine contractility, and the myogenic nature of uterine contraction has been postulated. The myogenic activity of uterine vessels is well recognized if the uterine muscle is stimulated mechanically its intrinsic myogenic activity is increased. Recent electrophysiological studies provide theoretical evidence bearing on this problem. When strips of pregnant uterus are passively stretched no tension on them increased, the membrane potential is reduced and spike frequency is increased.

The extraovular method which is based on the introduction of a solution into the uterus in an extraovular route has been known for a long time. In 1595 Avicenna, (As quoted from Nabriiski 1971) devised a special apparatus for introduction of such solution into the uterus to cause abortion. In 1825 Schneehaus (as quoted from Nabriiski 1971) advised the same method for the operation. The search for a safer solution led to the discovery of Rivanol or acrinol lactate.

Cohen in 1846 (as quoted by Rastogi et al (1981)) first described the extraovular injection for termination of pregnancy in second trimester. It is a derivative acridine, a yellow dye stuff with antiseptic action. It has been used as a 0.05 to 0.02% solution either locally

or as a surgical skin antiseptic or internally as disinfectant for the urinary tract. It is a 6,9 diamino - 2- oxyethyl acridine lactate.

In soviet union Pytel (As quoted by Rastogi, K. et al 1981) and associates reported 5 cases of acute renal failure after extraamniotic instillation of Rivanol. However, very large volumes (500 to 700 cc) of 0.1% solution of Rivanol were used in these cases. In Japan on the other hand no serious complications have been reported. However the volume used in that country were no more than 30-300 ml of 0.1% solution. The use of ethacridine lactate dates from 1949 but more extensive studies have been carried out only recently by Manabe (1969).

Nahriiski and Kalmanovitch (1971) modified the original rivanol catheter technique by removing the catheter immediately after injection and their success rate was 94%. Carl Axel Dagemanson of Sweden (1973) compared the results of rivanol with extraamniotic injection of hypertonic saline and concluded that the overall results with rivanol were better and the initial success rate was 74% with saline induction as compared to 94% in rivanol catheter group with remarkably few complications.

Ethacridine lactate administered extraamniotically causes mechanical stripping of entire sac from the uterine wall.

It causes reflex release of oxytocin (Lewis and Stillwell, 1971), it causes release of prostaglandins Gustavie (1974) suggested that any solution given extraovularly causes release of lysosomal enzymes within the decidual cells which help in release of prostaglandins precursors from the membrane phospholipids and thereby help in synthesis of the prostaglandins.

Anjaneyulu et al (1977) reported 81%, 4% abortion within 72 hours after first instillation and 100% after re-instillation. They used Unitocin (Spartan Sulphate) 150 mg I.M. 1 hourly for 3 doses to assist the process of expulsion.

In the series of Guppa et al (1977) the success rate with Encredylyl was 28% in 48 hours and total 92% in 72 hours and method failure was 4%.

There is disagreement on the nature of change produced on the placenta and membrane after intraamniotic injection of hypertonic solutions. The lesions described have included necrosis of amion (Stamm and De-Matteville 1954) as quoted from Christie et al (1966), an intense "necrotising placentitis" (Bangtesson and Stormby, 1962) intervillous and thrombosis of chorionic vessels with chorioamnionitis (Sochner et al. 1964), as quoted from Christie et al (1966) other workers did not detect any change in the placenta and membrane (Nood et al : 1962).

However, Jaffion et al (1962) did not find any microscopic evidence of deciduitis but did describe intervillous thrombosis in subchorionic zone. Klapper et al (1966) also found bulk of placenta normal but for superficial coagulative necrosis. Christie et al (1966) observed oedematous membranes in all and thin irregular zone of red thrombus in 5 out of 7 placentae of hypertonic saline abortions on microscopic examination.

Randers and Manietha (1972) as quoted from Salhan Sudha et al (1979) on histological examination of placenta and membrane could only attribute mild inflammation with polymorphonuclear leucocytosis to I/A saline injection. The histological findings of Salhan Sudha et al (1979) were similar to those reported by Gustavie and Brunk (1971). They observed that degenerate cells underneath nitabuck membrane showed extensive digestive alterations. Brunk and Gustavie (1973) as quoted from Salhan Sudha et al (1979) came to the conclusion that the saline diffuses out through membrane and acts on decidua which lies in the extra amniotic space. It is therefore, possible that the decidua is the target in the action of hypertonic saline. The damage to the decidua causes release of prostaglandin P_2 into amniotic fluid exerting its abortifacient activity (Gustavie and Brunk 1971).

Vassilakos et al (1974) were also able to demonstrate a surprising vulnerability of decidua during saline abortion by observing degenerative changes as early as 2 hours after saline instillation.

Myers et al (1974) upheld this findings. Llewellyn et al (1975) recorded a steady rise in prostaglandins P_2 levels after intraamniotic saline injection.

Similar findings were reported by Gustavia and Green (1972).

MATERIAL AND METHODS

MATERIAL AND METHODS

Two hundred cases were selected as per MTP act for termination of pregnancy between 12-20 weeks of pregnancy, and were admitted in the department of Gynaecology and Obstetrics at M.L.B. Medical College, Jhansi during the period of May 1981 to April 1982.

Age, marital status, race, religion, address were recorded. The group included both nulliparous and multiparous. All patients were screened by history and physical examination prior to hospital admission and particular attention was paid for cardiovascular, respiratory and renal condition. Patients having associated or co- incidental medical condition were first referred for appropriate medical consultation. Thereafter a detailed clinical history of the cases was taken including age, parity, relevant present and past history.

History of present pregnancy :-

The date of last menstrual period was correctly noted and history of present pregnancy including even the slightest complication was recorded.

Past History :- The history of all possible complications of pregnancy and labour during previous pregnancies were recorded.

Examination of the patients :- A through general and systemic examination was done.

Abdominal examination :- Abdominal examination for fundal height and for correlation of the fundal height with period of amenorrhoea and for localisation of foetal parts was done.

Perc vaginal examination :- Biannual examination was carried out for assessment of size of the uterus. Routine admission lab work included total and differential blood counts, Hb percentage & urine analysis. Grouping and cross-matching was carried out for all grand multiparous and for patients with history ^{of} ₁ uterine surgery. The patients were divided into 3 groups.

Group I - For Hysterectomy

Group II - For Intraamniotic Devices

Group III - For Extraamniotic Devices

Group I mainly consisted of multipara who were tubectomised alongwith. The patients were hospitalised throughout the procedure.

AMNIOTOCENTESIS

Amniocentesis is the insertion of a needle into the amniotic cavity.

Technique :- Abdominal Route.

Preliminary Procedure

Amniocentesis may be safely undertaken as an outpatient procedure without premedication of the patient. The patients were told about the procedure and the reasons for it and were given the opportunity to ask questions so that anxiety was minimized. Many authorities consider that placental localisation is desirable prior to amniocentesis to reduce the risk of needle injury to the placental separation.

However, in the present study area between foetal arms and legs and the area of the nape of foetal neck were used as sites for insertion of the needle without prior placental localization.

Equipment & Materials Required :-

The tray for the amniocentesis procedure normally contains the following.

- 1) One 18 gauge spinal needle (length 3.5"-6") depending upon the obesity of the patient.
- 2) One pair of sponge holding forceps.
- 3) Sterile swabs and sponges.
- 4) Small abdominal towel.
- 5) Antiseptic solution and container.
- 6) Sterile 20 ml. 2 syringes.
- 7) Appropriate bottles to receive specimens.

Preparation of Site :- The patient is asked to void urine.

She is then made comfortable in the dorso-recumbent position on an examination bed with the head and shoulders slightly elevated to promote relaxation of the abdominal muscles.

The abdomen is then gently palpated to determine the size of the uterus and height of the fundus. The area between the foetal arms and legs and the area of the nape of the foetal neck are the most suitable sites for insertion of the needle. Abdominal scars are avoided as tissue in such an area is difficult to traverse and there is the chance of encountering adherent intestine or omentum.

Procedure :- Having selected the puncture site, the operator and the attendant wear masks and caps and the operator scrubs and puts on sterile gown and gloves. The patient's abdomen is prepared with antiseptic solution and the sterile abdominal towel. It is unnecessary to use local anaesthetic infiltration of the puncture site before insertion of the amniocentesis needle.

It is essential to use very sharp needle. The needle with stylet is passed with a quick thrust through the abdominal walls into the amniotic cavity at a selected site. The average depth of insertion required is 3-4 cms. Usually a sensation of 'give' is obtained as the needle point enters the amniotic cavity. The stylet is removed from the needle and if placement has been successful, amniotic fluid may flow up through the needle. The twenty ml. syringe is now attached to the hub of the needle and (while being careful not to disturb the position of the needle) an attempt is made to aspirate the fluid. Depending on the period of gestation clear liquor ranging from 50-200 ml was removed. Depending upon the drug chosen (20% saline 40% urea solution, 2.5 mg (10 ml) carboprost tromethamine efcortin or distilled water) the same amount were instilled directly by syringe. In patients chosen for I/A efcortin only 10 cc liquor was removed. After successful aspiration of the fluid the needle is quickly withdrawn and the puncture site covered with small sterile dressing.

Pulse chart was maintained. A pair of laminaria tent were inserted in all patients. Five injections of spartin sulphate were given to all patients at $\frac{1}{2}$ hrly interval commencing immediately after instillation. The patients were allowed to labour spontaneously. Those who remained undelivered 72 hours after the procedure were considered failures. They were surgically evacuated later. Operative procedure, induction, abortion interval and operative complications were noted. All foetuses were examined and a few placenta examined histopathologically.

During labour analgesics were given to patients on request. Fasting before drug instillation was discouraged and regular diet was maintained. If digital removal of placenta failed, sedatives were given to patients intramuscularly before instrumental removal was attempted. Postpartum patients were discharged not less than six hours after an uncomplicated complete delivery. On discharge the patients were advised prophylactic antibiotics. The patients were advised to come for a follow up and family planning advice if needed, weekly, for 3 weeks.

Reagents :-

- 1) 20% Saline
- 2) 40% urea prepared by dissolving 80 gms fresh urea powder in 200 ml. distilled water. It was then autoclaved.

- 3) Distilled Water
- 4) Carboprost tromethamine (2.5 mg)
- 5) Eferlin (400 mg)

Extraamniotic Route :- For extraamniotic injection of emeredil 45 patients were selected between 12-20 weeks gestation. The instillation was carried out in operation theatre. The patient was put in lithotomy position. Part was painted and draped. Anterior lip of the posterior vaginal walls were retracted. Anterior lip of the cervix was caught with a volsellum. A foleys Catheter No 16 was put for about 15-20 cm through cervix in Uterine Cavity. The bulb of Catheter was inflated with 10-20 cc of distilled water. About 50-150 ml (depending on period of gestation) of emeredil was instilled within 10 minutes. The other end of catheters was folded and tied, augmentation with unitecin 5 ampoules at $\frac{1}{2}$ hourly interval was done. Re-instillation was done in cases if and when required. The patients were discharged 6 hrs after abortion and asked to come for follow up visits weekly ~~for 3 weeks~~, for 3 weeks.

In 20 cases termination was carried out simply by Catheter. The procedure was same as above with the difference that the no. of Catheters ranged from 2-3 and no dye was injected spartin sulphate was used 5 amp. $\frac{1}{2}$ hrly starting immediately after inserting the Catheter. Curettage was carried out ~~if~~^{and} when required. All foetuses were examined and a few placenta histopathologically examined.

The patients were discharged 6 hrs. post partum and were asked to come for follow up visit weekly for three weeks.

HISTEROTOMY

In 45 cases hysterotomy was carried out.

Procedure :-

Anaesthesia - General or spinal anaesthesia was given.

- Abdomen was painted and draped.
- It was opened by a paramedian incision in layers.
- Uterus was visualised
- a vertical incision was then made low in the midline of the uterus.
- The wound was enlarged with fingers.
- Sac was ruptured.

The foetus alongwith placenta was removed manually.

- Gentle Curettage of the cavity was done.
- Intravenous methergin 1 ampoule was injected intravenously simultaneously.
- Uterus was closed in two layers.
- Peritonium was stitched.
- Abdominal toilet was done.
- Abdomen was closed in layers.
- Vaginal toilet was done.
- Dressing was done
- All foetuses were examined.
- Stitches were removed on the 7th Day
- The patients were kept on antibiotics throughout this period.
- They were discharged after removal of the stitches on the 7th day and were asked to come for a follow up visit weekly for three weeks.

O B S E R V A T I O N S

OBSERVATIONS

The present study was carried out in the Department of of Obstetrics and Gynaecology and Pathology, M.L.B. Medical College, Jhansi during the period of April 1981 to April 1982.

Table No. I

Various Indications for M.T.P.

Indications for M.T.P.	No. of cases	Percentage
Unmarried	116	47.3
Widow	8	3.2
Divorces	9	2.8
Socio Economic	46	18.7
Spacing	34	13.8
Failed Contraception	28	11.4
Medical	6	2.4
Total	245	

The highest percentage i.e. 47.3% of the patients belonged to unmarried group. These were usually young girls with illegal pregnancies. The next i.e. 18.7% of cases belonged to low socioeconomic group. M.T.P. due to failed contraception and spacing was carried out in 11.4% and 13.8% cases respectively. The rest 8% cases included the Divorces, widows and patients in whom termination was carried out for Medical reasons.

Table No. II
Various Methods of Termination

Method	No. of cases
Hysterectomy	45
I/A Hypertonic Saline	45
I/A 40% Urea	20
I/A Eferlin	20
I/A Distilled Water	30
I/A Prostaglandins	20
Extraamniotic Catheter	20
Encredil	45
Total	245

Table No. III shows age, parity weeks of gestation, Martial status and religion of the patients undergoing termination of pregnancy. The patients for hysterectomy were all married and multiparous and above the age of 30 years. This was the group which was tubectomised alongwith. The ratio of urban and rural population was 2:1. Out of 45 patients 17 were Muslims and 28 were Hindus. There was 45 patients in which hypertonic saline was injected of these 31 belongs to age groups below 20 years, 9 belonged to age group between 21-30 years and 5 were above 30 years. 27 were nulliparous and 18 were multiparous. One belonged to gestation period between 12-14 weeks and 23 belonged to gestation period between 15-17 weeks and the rest belonged to gestation period between 18-20 weeks.

Age, parity, weeks of gestation, marital status & religion

Age (years)	Hysterectomy N=65	1/A Hypertonic saline N=45		Distilled water N=30		1/A 40% Glycerin N=20		1/A 11m N=20		Carbo-uterine 11 post Catheter N=45		Extra troneth- amide N=20	
		31	20	10	8	14	7	29	9	8	6	4	8
21-30	-	9	8	8	6	4	6	11	5	5	2	5	5
31-40	45	5	2	2	6	2	5	20	12	10	9	3	32
Parity		27	20	12	10	9	8	10	12	12	12	12	13
Nulliparous	-	18	10	8	10	8	7	12	12	12	12	12	12
Nulliparous	45	18	10	8	10	8	7	12	12	12	12	12	12
Religious		1	2	-	-	-	-	2	3	3	6	-	-
12 - 14	-	23	16	12	12	12	12	6	6	6	8	8	15
15 - 17	15	21	12	8	8	8	8	12	9	9	9	9	24
18 - 20	20	21	12	8	8	8	8	12	9	9	9	9	23
Marital status		13	10	9	9	9	9	10	11	11	11	11	16
Married	45	32	20	12	14	14	14	10	9	9	9	9	29
Married	-	-	-	-	-	-	-	-	-	-	-	-	-
Residence		15	14	6	14	12	9	12	9	12	9	12	16
Urban	30	30	16	14	16	14	16	12	12	12	12	12	29
Rural	-	-	-	-	-	-	-	-	-	-	-	-	-
Religion		22	19	18	20	15	15	20	15	15	15	15	32
Hindu	28	24	14	14	2	2	2	5	5	5	5	5	42
Muslim	30	21	8	8	-	-	-	-	-	-	-	-	1
Christian	-	-	-	-	-	-	-	-	-	-	-	-	-

13 were married and rest unmarried. 15 were urban and rest belonged to the rural group. 24 of these were muslims and rest Hindus.

In 30 cases distilled water was injected intraamniotically. 20 cases belonged to age group below 20 years. 8 belonged to age group 21-30 years, and 2 belonged to age group above 30 years. Out of 30, 20 cases were nulliparous and the rest multiparous. The gestation period of 2 patients were between 12-14 weeks, of 16 patients between 15-17 weeks and of 12 patients between 18-20 weeks. Out of the 30 patients, 20 were unmarried and 10 married, 16 belonged to rural group and 14 to urban group. 22 of the 30 were Hindus and 8 muslims.

Out of 20 patients in whom 40% urea was injected, 10 , 8 and 2 patients belonged to below 20 years, between 21-30 and above 30 years respectively. 12 patients were married , 12 were between 15-17 weeks gestation period and 12 nulliparous. The rest 8 were multiparous, 8 were between 18-20 gestation period and 8 married. 14 patients belonged to rural group and 6 to urban group. 16 patients were Hindus and rest Muslims.

There were 20 patients in which efoorlin was injected. Out of these 6 each belonged to age group 21-30 years and above 30 yrs and 8 cases were below 20 yrs. Half were nulliparous and half multiparous. Out of 20 patients, 12 belonged to the gestation period between 15-17 weeks and the rest between 18-20 weeks. 14 of the 20 patients were unmarried and 6 patients were married.

14 belonged to urban group and 6 were rural group. 18 of the 20 patients were Hindus and rest muslims.

14 out of 20 patients in which I/A Carboprost was injected and 7 out the 20 cases in which extrauterine Catheter was put in belonged to age group below 20 years. 4 of the former and 8 of the latter belonged to 21-30 age group respectively. The rest 2 of the Carboprost group and 5 of the Catheter belonged to age group above 30 years. 8 each of Carboprost group and Catheter group and 12 each of the same groups were nulliparous and multiparous respectively. 2 of the Carboprost group and 3 of the Catheter group belonged to gestation period 13-14 weeks. 6 of the former and 4 of the latter belonged to 15-17 weeks gestation period and the rest of the Carboprost group and 9 of the Catheter group belonged to 18 - 20 weeks gestation period. In Carboprost group, half of the patients were married and half unmarried. In Catheter group 11 were married and 9 unmarried. In Carboprost group 12 patients belonged to urban group and in Catheter group it was the other way round. In Carboprost group all patients were Hindus were as as in Catheter group 15 patients were Hindus and 5 were Muslins. 2

out of the 45 cases in which emoredil was injected 29 belonged to age group below 20 years, 11 cases were in the age group 21-31 years and 5 cases were above 30 years.

32 cases were nulliparous and 13 were multiparous. 6 patients belonged to 12-14 weeks gestation period, 15-to 15-17 weeks gestation period and the rest were between 18-20 weeks. 18 of the 45 patients were married, rest unmarried. 29 patients belonged to rural group and 16 to urban group. 32 patients were Hindus 12 muslims and 1 patients was chrisitan.

Table No. 4

Induction Abortion Interval with Saline

Induction abortion Interval in hrs.	No. of patients	Percentage of cases
Within 24 hrs.	31	68.9
24-36 hrs.	8	17.8
36-48 hrs.	4	8.9
48-72 hrs.	1	2.2
Failure	1	2.2

Table (4) shows that maximum no. of cases that is 31 out of 45(68.9%) aborted within 24 hours 8 patients (17.8%) aborted within 24-36 hours. 4(8.9%) patients aborted in 36-48 hrs. One (2.2 %) aborted within 48-72 hours. One case failed to abort within 72 hours and was considered a failure.

Table No. 5
Induction abortion interval with relation to period of
gestation with intraamniotic saline

Duration of pregnancy in weeks	Total n of pts.	Abortion within 24 hrs.	Abor- tion in 24-36 hrs	Abor- tion 36-48 hrs	Abor- tion in 48-72 hrs.	Abortion in 72 hrs.
12-14	1	-	-	1	-	-
15-17	23	16	4	2	-	1
18-20	21	15	4	1	1	-
Total	45	31	8	4	1	1

Table 5 shows relationship between period of gestation and induction abortion interval. There was only one case on 12-14 weeks gestation and it took 36-48 hours to abort. Out of 23 pts., in 15-17 weeks gestation 16 aborted within 24 hours, 4 aborted in 24-36 hours and one each within 36-48 hours and 48-72 hours respectively. One case in the 15-17 weeks age group failed to abort in 72 hours and was considered in failure.

Table No. 6
Induction Abortion Interval with 40% urea

Induction Abortion Interval in hours	No. of cases	Percentage of cases
Within 24 hours	8	40
24-36 hours	4	20
36-48 hours	6	30
48-72 hours	2	10
Failure	-	
Total	20	

Out of the 20 cases in which Hypertonic urea solution was injected 8 (40%) aborted within 24 hours 4 (20%) aborted within 24-36 hours 6 (30%) aborted within 36-48 hours, and 2 patients i.e. 10% aborted in 48-72 hours. All 20 patients aborted within 72 hours and no failure was observed.

Induction Abortion Interval in Relation to
period of Gestation with I/A 40% Urea

Table No. 7

Duration of pregnancy in weeks	Total no. of patients	Abortion in 24 hrs. no. of cases	Abortion in 24-36 hrs no. of cases	Abortion in 36-48 hrs no. of cases	Abortion in 48-72 hrs no. of cases	72 hrs.
12-14	0	-	-	-	-	-
15-17	8	2	2	4	-	-
18-20	12	6	2	2	2	-
Total	20	8	4	6	2	

Table No. 7 shows that out of the 8 patients in 15-17 weeks gestation period 4 aborted within 36-48 hrs, 2 aborted within 24-36 hours and 2 aborted within 24 hours. In 18-20 weeks gestation period 6 patients aborted within 6 hours and 2 patients each took 24-36 hours and 36-48 hrs and 48-72 hrs respectively.

Table No. 8 shows that out of 20 patients in which eferolin was injected 2 cases (10%) aborted in 24-48 hrs and majority i.e. 14 (70%) cases aborted in 48-72 hrs. (20%) failed to abort within 72 hours and were considered failure.

Table No.8
Induction Abortion Interval with Efgantin

Induction Abortion interval	No. of cases	Percentage of cases
Within 24 hrs.	-	-
24-36 hrs.	-	-
36-48 hrs.	2	10
48-72 hrs.	14	70
Failure	4	20
Total	20	

Table No.9
Induction Abortion Interval in Relation to the period of Gestation with I/A Efgantin

Duration of pregnancy in weeks	Total no. of cases	Abortion within 24 hrs.	Abortion 24-36 hrs.	Abortion in 36-48 hrs.	Abortion in 48-72 hrs.	Abortion 72 hrs.
12-14	-	-	-	-	-	-
15-17	12	-	-	-	-	4
18-20	8	-	-	2	6	-
Total	20	-	-	2	14	4

Table No.9 shows that out of the 12 patients in 15-17 weeks gestation period 8 aborted in 48-72 hours and 4 were failures i.e they did not abort within 72 hours. Out of the 8 patients in 18-20 weeks gestation period 2 aborted within 36-48 hours and 6 within 48-72 hours.

Table No. 10

Induction abortion Interval with Distilled Water

Induction abortion interval in hours	No. of cases	Percentage of cases
Within 24 hours	-	-
24 - 36 hrs.	2	6.7%
36 - 48 hrs.	8	26.7
48 - 72 hrs.	16	53.3
Failure	4	13.3
Total	30	

Table 10 shows that majority that 16 out of 30 (53.3%) cases took 48-72 hours to abort 8 patients (26.7%) aborted within 36-48 hours and 2 patients (6.7%) aborted within 24-36 hours. 4 patients (13.3%) failed to abort within 72 hours.

Induction abortion Intervals in relation to period of Gestation with I/A distilled water

Table No. 11

Duration of pregnancy in weeks	Total no. of pts.	Abort- ion in 24 hrs. no. of cases	Abort- ion in 24-36hrs. no. of cases	Abort- ion in 36-48 no. of cases	Abort- ion in 48-72 no. of cases	Abort- ion in 72 hrs. no. of cases
12-14	2	-	-	-	-	2
15-17	16	-	-	4	8	4
18-20	12	-	2	4	6	
Total	30	-	-	8	16	4

Table No. 11 shows that 2 patients belonging to the 12-14 weeks gestation took 48-72 hours to abort. Out of the 16 patients of 15-17 weeks gestation 8 aborted within 48-72 hours, 4 within 36-48 hours and 4 cases failed to abort in 72 hours. In the 18-20 weeks gestational group there were 12 patients of these two aborted within 24-36 hours, 4 aborted in 36-48 hours and the rest six took 48-72 hours to abort.

Table No. 12
Induction abortion interval with Carboprost Trenethamine
(DGP₂ Alpha)

Induction Abortion Interval in hours	No. of cases	Percentage of cases
Within 24 hrs.	14	70
24 - 36 hrs.	4	20
36 - 48 hours	-	-
48 - 72 hrs.	-	-
Failure	2	10
Total	20	-
	6	

Out of the 20 cases in which Carboprost was injected 14 patients (70%) aborted within 24 hours and 4 patients (20%) aborted within 24 - 36 hours. 2 out of 20 patients failed to abort within 72 hours and were considered failures.

Table No. 113

Induction abortion interval in relation to period of
Gestation C Carboprost tromethamine

Duration of pregn- ancy in weeks	Total no. of pts.	Abort- ion within 24 hrs.	Abort - ion in 24-36 hrs.	Abort - ion in 36-48 hrs.	Abort - ion in 48-72 hrs.	Abortion in > 72 hrs.
12-14	2	2	-	-	-	-
15-17	6	4	2	-	-	-
18-20	12	8	2	-	-	2
Total	20	14	4	-	-	2

2 patients belonging to 12-14 weeks gestation aborted within 24 hours out of 6 patients of 15-17 weeks gestation 4 aborted within 24 hours and 2 aborted in 24-36 hours. Out of 12 patients of 18-20 weeks gestation 8 aborted within 24 hours and 2 aborted in 24-36 hours. Two patients of this gestation period failed to abort.

Table No. 14

Induction abortion interval with extraamniotic catheter

Induction abortion interval in hrs.	No. of cases	Percentage of cases
Within 24 hrs.	6	30
24-36 hrs.	7	35
36-48 hrs.	4	20
48-72 hrs.	1	05
Failure	2	10
Total	20	

Table No. 14 shows that out of 20 cases in which extra uterine Catheter was put in 6 (30%) aborted within 24-36 hours. 7 (35%) took 36-48 hours to abort and one patient took 48-72 hrs to abort. There were 2 cases who failed to abort.

Table No. 15
Induction abortion interval in relation to period of
gestation with extra uterine catheter

Duration of pregnancy in weeks	Total No. of pts.	Abort- tion in 24 hrs.	Abort- tion in 24-36 hrs.	Abort- tion in 36-48 hrs.	Abortion 48-72 hrs.	72 hours
12-14	3	-	-	1	-	1
15-17	9	4	2	2	1	-
18-20	8	2	5	-	-	1
Total	20	6	7	4	1	2

The above table shows that out of 3 patients in 12-14 weeks gestation 2 patients took 36-48 hours to abort and 1 did not abort within 72 hours hence was considered as a failure. In 15-17 weeks gestation age group there were 9 patients of these 4 aborted within 24 hours and 2 cases each took 24-36 hours, and 36-48 respectively. A single patient took 48-72 hours. In 18-20 weeks gestation there were 8 patients 2 of which aborted within 24 hours, 5 within 24-36 hours and one was a failure.

Table No. 16Induction abortion interval with emeredil

Induction abortion interval in hours	No. of cases	Percentage of cases
Within 24 hours	9	20
24 - 36 hours	16	35.6
36 - 48 hours	15	33.3
48 - 72 hrs.	4	8.9
Failure	1	2.2

Table No. 16 shows induction abortion interval in 45 cases, where emeredil was used by extraamniotic route. Out of 45 cases, 9 cases aborted within 24 hours. 16 cases (35.6%) took 24-36 hours to abort. 15 cases (33.3%) aborted within 36-48 hours and 4 cases (8.9%) took 48-72 hours to abort. One patient i.e. 2.2% cases failed to abort altogether.

Table No. 17Induction abortion interval with relation to period of gestation with emeredil

Duration of pregnancy in wks.	Total no. of pts.	Abort. within 24 hrs.	Abort. in 24-36	Abort. in 36-48	Abort. in 48-72	Abort. in 72 hrs.
12-14	6	-	3	2	1	
15-17	15	3	7	3	1	1
18-20	24	6	6	10	2	-
Total	45	9	16	15	4	1

There were 6 patients in 12-14 weeks in gestation period. Out of these 3 aborted in 24 - 36 hours, 2 in 36-48 hrs and 1 in 48-72 hrs. In 15-17 weeks gestation period there were 15 patients of these 3 aborted within 24 hrs, 7 in 24-36 hrs, 3 in 36-48 hrs, 1 in 48-72 hrs and one was a failure. Out of 24 patients belonged to 18-20 weeks gestation period 6 each aborted within 24 hours and in 24-36 hrs, 10 aborted in 36-48 hrs, and 2 in 48-72 hrs.

Table No. 18
Showing success rate with various methods.

Method	Total No. of cases	Successful abortion (No. of cases)	Success rate (%)
I/A Saline	45	44	97.8
I/A 40% Urea	20	20	100
I/A Distilled water	30	26	86.7
I/A Carboprost	20	18	90
I/A Eicorlin	20	16	80
E/A Catheter	20	18	90
E/A Encretil	45	44	97.8

Intraamniotic hypertonic saline and extraamniotic emeredil showed a highest success rate of 97.8% after I/A urea in which the success was 100%. The next in series are I/A Carboprost and E/A Catheter which showed a successful rate of 90% each. With efcorlin only 16 out of 20 patients aborted giving a success rate of 80%.

Table No. 19
Showing mean induction abortion interval
With different methods

Methods	No. of cases	Mean Inducing abortion interval	
I/A Saline	45	24 hrs.	24 min.
I/A Urea	20	31 "	18 "
I/A Efcorlin	20	49 "	56 "
I/A Carboprost	20	22 "	29 "
I/A Distilled water	30	47 "	36 "
E/A Catheter	20	31 "	10 "
E/A Emeredil	45	34 "	14 "

The smallest induction abortion interval was observed in intraamniotic carboprost of 22 hrs. and 29 min. The next was with Intraamniotic hypertonic saline. It was 24 hrs. 24 min. The mean induction abortion interval in Extraamniotic Catheter was observed to be 31 hrs. 10 min. and with urea it was 31 hrs. 18 min. The induction abortion interval with distilled water was found to be 47 hrs. and 36 min. and the the longest interval of 49 hrs. 56 min. was observed with I/A Efcorlin.

Table No. 20
Showing success rate within 24 hrs.

Induction abortion interval within 24 hours	No. of cases aborted	Total No. of cases	Percentage
I/A Saline	31	45	68.9
I/A Urea	8	20	40
I/A Efcorlin	-	20	-
I/A distilled water	-	30	-
I/A Prostaglandin	14	20	70
E/A Catheter	6	20	30
E/A Encredil	9	45	20

The maximum no. of pts. that is 14 out of 20 (70%) of total patients treated with prostaglandins aborted within 24 hrs. I/A saline also showed a fairly high percentage within 24 hours 31 (68.9%) out of 45 patients were seen to abort within 24 hours- 8 out of 20 i.e (40% of patients treated with urea aborted within 24 hours. 6 out of 20 (30%) 9 out of 45 (20%) patients treated with extraamniotic rubber catheter and extraamniotic encredil respectively aborted within 24 hours- None of the patients treated with distilled water and efcorlin were seen to abort within 24 hours.

43 out of 44 patients treated with encredil aborted completely showing a complete abortion rate of 97.7%. Abortion was complete in 40 out of 44 pts (90.9%) treated with extraamniotic rubber catheter aborted completely giving a complete abortion rate of 88.88%. 17 out of 20 patients treated with urea aborted completely. The complete abortion rate was being 85%. 23 out of 26 (84.6%) of patients treated with distilled water, and 13 out of 16 (81.25%) aborted completely.

Abortion was found to be complete in 4 out of 18 (77.77%) patients treated with carboprost tromethamine.

Table No. 21

Showing complete and incomplete abortions with different Methods

Method	Complete		Incomplete	
	No. of cases	%	No. of cases	%
I/A Saline	40	90.9%	4	9.1%
I/A Urea	17	85%	3	15%
I/A Efcarin	13	81.25%	3	18.75%
I/A Carboprost	14	77.77%	4	22.23%
I/A distilled water	23	87.4%	3	15.7%
E/A Catheter	16	88.8%	2	11.2%
E/A Encredil	43	97.7%	1	2.3%

Table No. 22

Failure Rates with Different Methods

Method	No. of cases	Failure	Failure Rate
I/A Saline	45	1	2.2%
I/A Urea	30	-	-
I/A Distilled water	30	4	13.3%
I/A Carboprost	20	2	10%
I/A Efcarin	20	4	20%
E/A Catheter	20	2	10%
E/A Encredil	45	1	2.2%

Table No. 23

Shows Management of cases who failed to abort

S.NO.	I/A Saline	I/A Disti- illed water	I/A Carbox- rest	I/A Ecor- lin	E/A Cathe- ter	E/A Emcredil
1. Aborted after cutoff time without interference	1	1	-	2	-	-
2. Syntocinon drip			1	1		
3. Repeat emcredil						1
4. Hysterotomy			1	1	1	
5. Emcredil			1		1	
6. I/A Saline						1
7. Patient left hospital after cutoff time without supplementary procedure						1
Total	1	4	2	4	2	1

The single patient who had failed to abort with hypertonic saline aborted after cut off time without interference. Out of the 4 patients who had failed to abort with distilled water, one aborted after the cut off time without interference.

One aborted after extraamniotic emoredil injection. One required hysterotomy and one aborted with syntocinon drip. Out of the 2 patients who failed to abort with carboprost tromethamine, one aborted with syntocinon and in the other hysterotomy was done. Out of the 4 patients who failed to abort with I/A efcortin injection to aborted after the cut off time without interference. One aborted after emoredil instillation and one required hysterotomy. Out of the two patients, who failed to abort with extramniotic catheter, one aborted after the treatment with hypertonic saline, and the other left the hospital after the cut off time without supplementary procedures. The only patients who had failed to abort after emoredil injection aborted after repeat emoredil injection.

The table No. 24 shows the total no. of cases treated with different drugs who turned up for follow up work as follows. 40 out of 45 of saline group, 26 out of 30 of distilled water group, 16 out of 20 of carboprost group, 15 out of 20 and 16 out of 20 of efcortin and carboprost tromethamine group respectively. 17 out of 20 of catheter group, 14 out of 20 urea group, 41 out of 45 of emoredil group, and 40 out of 45 of hysterotomy group. Of these 30, 23 and 14 patients of saline, distilled water and carboprost group, complained of vaginal bleeding of following abortion upto 5 days. Similarly 10, 16 and 10 patients of the efcortin, catheter and urea group, and 38 and 34 patients of the emoredil and hysterotomy group complained of vaginal bleeding up to 5 days.

Bleeding for 6 to 15 days continued in 7, 3, 4, 1 patients of saline, distilled water, carboprost, and efcorlin group respectively. Similarly, it continued for the same duration in 1, 4, 2, and 5 patients of the catheter, urea, emredil and hysterotomy groups respectively. Bleeding for more than 15 days was seen in 3 cases of saline group, 1 of carboprost and one of efcorlin group. Similarly it was seen in 1 case of emredil and 1 of hysterotomy group.

In the saline group, 1 complained of fever and 1 of low abdominal pain. In distilled water group, 1 complained of vaginal discharge, and 2 of fever. Of the carboprost group, 1 complained of vaginal discharge and 1 of low abdominal pain. In efcorlin group, one each complained of vaginal discharge and fever respectively. Similarly in the catheter group, 3 complained of vaginal discharge and 1 of fever. In the urea group, 1 patients complained of vaginal discharge. In the emredil group, 1 complained of vaginal discharge and 2 of fever. and in the hysterotomy group, 2 pts.. complained of fever. Pelvic examination of all cases revealed normal findings. 5 patients were readmitted. One of the saline group for bleeding one of the distilled water group for retained products, 1 of the catheter group, the cause being sepsis. 2 of the hysterotomy group were readmitted, the cause being bleeding in 1 and sepsis in the other.

Table 25 shows the various complications that were observed with different methods. In efcorlin group, slight pain during instillation was observed in 1 patient. In 1 patient the temp. rose to above 38 degrees during hospitalization. In 1 case, there was blood loss of more than 300 ml.

In the hysterotomy group a fall of B.P. below 100 mm Hg was observed in 4 patients. A temp. rise of more than 38°F was observed in 3 cases. A blood loss of more than 300 ml. was seen in 5 cases and there was one death due to blood transfusion reaction. In the saline group, 6 patients complained of slight pain during instillation and 2 patients complained of severe pain during instillation. 4 complained of nausea two of vomiting. Post abortal bleeding was seen in 2 and the blood loss of more than 300 ml. in 3 patients. In 1 patient amniotic fluid embolism was presumed.

In the amcredyl group, 2 patients complained of temp. rise above 38°F and two complained of post abortal bleeding and one complained blood loss of more than 300 ml. In the urea group, there were 3 patients to complained of slight pain during instillation.

1 complained of severe pain. In 1 patient a temp. rise of more than 38°F was observed and in another patient blood loss of more than 300 ml was observed. In carboprost group, there were 3 pts. who complained of severe pain during instillation. Another 3 who complained nausea. 7 patients complained of vomiting and 5 of diarrhoea. Then 1 patient complained of flushing 3 complained of fall of B.P. below 100 mmHg and 1 complained of rise in temp. above 38°F and one complained of blood loss of more than 300 ml. In catheter group, there was no complained except that in one a temp. rise of 38°F was observed. Lastly, in the distilled water group, one each observed slight and severe pain during instillation. In two pts. flushing was observed. In 4 pts. a temp. rise of more than 38°F was observed. In 2 pts. a blood loss of more than 300 ml. was observed.

The placental lesions were studied in 22 cases. Out of these 10 belonged to the hysterectomy group, 6 belonged to the group, in which the pregnancy was terminated by hypertonic saline and the rest 6 belonged to the group in which pregnancy was terminated by encredil dye. The gestation period in all cases varied from 12 - 20 wks.

Placenta after hysterectomy :- This served as a control group. no gross abnormality was detected in any of the specimens.

Table No. 26 Showing placental lesions with saline and encredil.

	Saline	Encredil
(a) Epithelium :-		
Cytoplasmic vacuolation	-	1
Coagulative necrosis	3	1
Nuclear vacuolation	1	-
Pyknosis	-	3
Karyolysis	1	-
Desquamation of epithelium	-	2
(b) Stromal oedema	6	4
Degenerative changes of stromal cells	2	-
(c) Blood vessels		
Dilatation	3	1
congestion	3	1
Thrombosis formation	2	-
(d) ⁰ subchorionic zone		
Intervillous haemorrhage	5	2
fibrin deposits	2	-
Polymorph infiltration	2	1
Coagulative necrosis	2	1
hyaline degeneration	3	2

Table No. 26 shows the placental lesions in pregnancies terminated by saline and emeredil. In the saline group, coagulative necrosis was observed in 3 cases and nuclear vacuolation and Karyolysis in 1 each placenta. Desquamation of epithelium was not observed in any of the placenta. Stromal oedema was observed in all cases and degenerative changes of the stromal cells in two cases. Blood vessels showed dilatation and congestion. In 3 cases each and thrombus formation in 1 case. The subchorionic zone showed intervillous haemorrhage in five and fibrin deposits in two. Polymorph infiltration and coagulative necrosis of subchorionic zone was observed in 2 placenta each, and hyaline degeneration in 3. The umbilical cord showed oedema in 4 placentas and thrombus in 1. The changes were similar in emeredil group except that they were less marked. Cytoplasmic vacuolation and coagulative necrosis was observed in 1 case each. Mikyosis was observed in 3 cases, and desquamation of epithelium was present in 2. Stromal oedema was seen in 4 cases and not degeneration of stromal cells was observed. Dilatation and congestion of blood vessels was observed in 1 case. In the subchorionic zone intervillous haemorrhage was observed in 2 cases polymorph infiltration in one case and coagulative necrosis in 1. Hyaline degeneration was seen in 2 cases and oedema of the umbilical cord in 3 cases. No other changes were observed in this small series.

Changes in the umbilical cord.

	Saline	Emeredil
oedema	4	3
thrombus	1	-

123333333333
*****444444444444*****

DISCUSSION

DISCUSSION

The problem of inducing effective uterine contractions for termination of pregnancy whenever obstetric indication exists has been occupying the minds of obstetricians and pharmacologists alike since the earliest days. A variety of methods to achieve this came into vogue from time to time, with large number of trials by various workers but none of the methods of termination even today is found to be satisfactory.

In the present series the pregnancies were terminated in the second trimester by hysterotomy, 1/10 hypertonic saline (20%), 1/10 40% urea, 1/10 distilled water, 1/10 eferolin and 1/10 carheprost trimethamine. Amongst the extraamniotic devices used extraamniotic catheter and extraamniotic emeredil dye were tried.

Abdominal hysterotomy was carried out in fortyfive cases though the operation is effective, is easy, control of blood loss is total and there is absolutely no chance of failure yet the method is not popular, not only because of chances of anaesthetic and operative complications but mainly due to the complications due to scar. Hysterotomy in the present series was carried out only in patients who were sterilized alongwith.

As regards complications in the present series there was blood loss of more than 300 ml. in 5 cases, fall of blood pressure below 100 mm Hg in 4 cases and a rise of temperature 30°F during hospital stay in 3 cases.

Blood transfusion was required in one of the rest were treated simply by intravenous infusion and antibiotics and antipyretics. There was however one death due to transfusion reaction. Transfusion was given due to excessive blood loss. In the present series the patients were followed only upto 3 weeks. Hence the outcome of the scar in future pregnancy or otherwise could not be assessed but it has been observed in a study conducted by Russell et al (1969) in a series of patients.

out of 50 patients, fifty two percent showed a normal hysteroogram and forty eight patients showed some deformity at the scar. The hysteroograms were classified into two groups based on the size of the deformity seen in the hysteroograms a minor scar being 2mm in depth and a major being 4 mm in depth. The relationship between incision and size of the deformity is shown in table (1).

Hysteroogram	Lower segment	Corpus incision	Total
Normal	3	28	31
minor scar	8/3	6 and 16	24
major scar	11	39	50

In view of the above mentioned complications and unpredictable outcome of the scar in future pregnancies the method is regarded as obsolete and is rarely practised nowadays.

Administration of hypertonic saline via intraamniotic route was taken up in 45 cases of gestation ages between 12-20 weeks. It showed a fairly high success rate of 97.8%. The mean induction abortion interval was found to be 24 hrs 24 min. and the percentage of patients aborting within 24 hrs was 69.9%.

The complications observed were pain during instillation in 8 patients, nausea and vomiting in 6 patients, fall of B.P. below 100 mm.Hg in 3 cases, a rise of above temperature 38°F during hospitalisation in 2 cases. ^{re} Presumed amniotic fluid embolism in one case and blood loss of more than 300 ml on 3 cases.

The result of present work is consistent with the results of Agarwal Savitri (1979) who showed a success rate of 97.5%. The mean induction abortion interval in her series was 36.2 hrs. as compared to 24 hrs. and 24 minutes in the present series. The difference was probably due to augmentation carried out by spartin sulphate in this series.

Results of hypertonic saline used for induction of
by various authors

58

Series	No. of cases	Mean induction abortion interval	Success Rate
Wood, Broth Pinkerton (1962)	22	28.5 hrs.	100%
Alpern (1968)	17	16.4 hrs.	100%
Pathak (1968)	47	18.5 hrs.	100%
Kerenyi (1973)	5000	22 hrs. 30 min.	
Savitri Agarwal (1979)	400	36.2 hrs.	97.5%
Present series	45	24 hrs. 24 min	97.5%

The complications observed by Kerenyi (1973) in his series of 5000 cases were as follows :-

1.	Retained placenta	12.9%
2.	Haemorrhage more than 500 ml	2.3%
3.	Clinical Hypofibrinogenemia	.3%
4.	Amniotic fluid embolism	.1%
5.	Fever	2.3%
6.	Cervical laceration	.1%
7.	Perineal laceration	.1%
8.	Failure	.4%

There was no case of maternal death reported in my small series.

Incidence of complications as seen by various authors

Post abortal fever	Incidence
Wagner (1962)	7.5%
Weingold (1965)	11.1%
Rerenyi (1971)	6.8%
Savitri Agarwal (1979)	3.7%
Present series	3.7%

It must be however recognized that vascular collapse and coma due to massive intravascular administration of hypertonic saline instillation is unique to the procedure. Therefore experience with this specialized new technique beyond the customary obstetrical training is necessary.

In st Magatsuma's (1973) series of 5000 cases no serious complication directly related to the administration of hypertonic saline was encountered. Most of the serious complications reported in the literature have been related directly to maldeposition of the hypertonic solution. Saline drip infusion requires approximately 10 min even if the needle is in the wrong compartment by mistake. Such slow administration permits the appearance of side effects before a sufficiently large volume of solution is deposited. By stopping the infusion and replacing the needle, the directly saline related serious complications can be prevented.

In view of high percentage of success rate (97.0%) there is little doubt that provided the following precautions are observed the technique of termination of

pregnancy in midtrimester by 20% hypertonic saline is one of the safest and most effective method.

- (1) Proper medical check up to exclude existing illness and systemic disorder is done.
- (2) The emptiness of bladder is ensured.
- (3) Avoidance of G/A either at the time of instillation or subsequently.
- (4) Giving up instillation if blood tap is obtained.
- (5) Instillation of saline is carried out only when liquor is clear and flowing freely.
- (6) The amount of saline to be instilled is kept below 200 cc and never exceeded.
- (7) The procedure should be immediately stopped, if the patient complains of pain and dizziness or intense thirst.
- (8) Injection of 5-10 cc of normal saline while withdrawing the needle from the amniotic cavity to prevent escape of hypertonic saline into peritoneal cavity and muscles.
- (9) Routine use of antibiotics to reduce post operative morbidity, provided these measures are carried out the method would prove to be one of the safest and most effective.

Intraamniotic urea was used in 20 cases. The success rate was 85% found to be 100%. Mean induction abortion interval was found to be 31 hrs. 18 min.

There were 85% complete abortions. The only complication was blood loss of more than 300 ml. in one case and pain during instillation in three cases.

Results of Urea solution for termination of midtrimester as observed by various authors.

Series	Induction abortion interval	Complete	Abortion in 24 hrs.
M. Kochhar without syntecinon (1981)	53.48 hrs		
Graft & Musa (1971)	40.67 hrs		
Rand and associate (1972)	49.60 hrs		
Smith-Newton (1973)	22.79 hrs		
Greenhalf Diggory (1975)	48 hrs.	1	
Rajan et al (1979) ^{Urea}	43 hrs 20 min.		56%
Urea and Pitocin	26 hrs 58 min.		24%
Present series	31 hrs. 18 min	85%	40%

Where as urea is considered to be extremely safe as an abortifacient agent, certain complications comparable to that of saline have been documented. Inadvertent injection of urea into the myometrium just as saline is proved to result in muscle necrosis as demonstrated by Parmely et al (1976) in Rhesus monkeys.

Recent literature also indicates the potentiality for coagulation defects in urea induced abortions. Burnett et al (1975) have demonstrated a fall in fibrinogen conc by approximately 15% after 8 hours of instillation of urea and lowest level recorded is 145 mgs. The mean platelet count showed a drop of approximately 18% and the fibrinogen fibrin degradation products (FDP) were significantly elevated in 30% of patients. Mackenzif and Linda (1978) reported changes consistent intravascular coagulation (rise in FDP, fall in plasma fibrinogen and reduction in platelet count) in pts. aborted with prostaglandins in combination with urea. Even though not totally free from dangerous complications hypertonic urea is completely safe and reasonably effective.

The mode of action of urea in causing abortion is not understood. Unlike saline it is rapidly disseminated in the body as has been confirmed by maternal urea level (Greenhalf et al 1971). No correlation between the rise in blood urea and injection abortion interval has been observed. Far higher doses of urea have been given in the past for the temporary treatment of cerebral oedema without serious consequences. Furthermore the high levels of blood urea fall to normal in a short time.

However hypertonic urea has got one drawback which is not shared by saline or dextrose. Urea in solution is not stable after autoclaving and it gradually decomposes to ammonia. Hence, many clinicians feel that urea solution should not be allowed to stand for a long period and only fresh solutions should be used for intraamniotic injection. If this view is held, urea abortion, with all its advantages, may not again wide clinical acceptance. Hence a study was carried out by Rajan et al (1979) in which he demonstrated that hypertonic urea can be used as a midtrimester abortifacient as late as 8 days after preparation of the solution.

Induction of abortion Interval

Age of urea solution	Mean abortion time
2nd day solution	37 hrs. 24 min.
3rd day solution	44 hrs. 20 min.
4th day solution	25 hrs. 12 min.
5th day solution	40 hrs.
6th day solution	36 hrs. 30 min.
7th day solution	37 hrs. 40 min.
8th day solution	45 hrs.
All the patients	38 hrs.

In successfully aborted patient the induction abortion interval ranged from 11 hours to 123 hours with a mean of 38 hours. When individually evaluated the mean abortion time showed only trivial difference in relation to the age of urea solution.

With the use of intraamniotic urea with unitocin the induction abortion interval time has been found to be reduced as compared to the use of urea alone as seen in Rajan et al series (1979). The mean induction abortion interval has been observed to be still less when prostaglandins were combined \ominus hypertonic urea but the limited supply of PGF_2 combined with the unpleasant gastro intestinal side effects precludes the use of this agent for mid trimester abortion. The incidence of complications has been found to be much less with urea and spartium sulphate.

The role of corticosteroid in initiating myometrial contractility in pregnant uterus of 12-20 weeks gestation was tried with success in 20 cases. The success rate was found to be 80%. Mean induction abortion interval was found to be 49 hrs. 56 min. and complete abortion was seen in 81.25% of cases. None of the case aborted within 24 hrs. Our observations were consistent with that of Parikh (1978). The success rate in his series of 15 patients who were aborted with 400 mg. of eferolin + 10 units syntocinon was 86.7%. Induction abortion interval was higher 62 hrs. 41 min. but there was no incomplete abortion. Failure rate was 13.3%.

Though the complications are few and method relatively safe, yet it is not popular because of the high cost of the drug, low success rate and because of the lengthened induction abortion interval.

The mechanism of cortisone induced abortion is not fully understood. In the sheep Higgins (1973) has proposed that cortisone shower released by the foetal lamb near term increases the level of placental prostaglandins, $P_2 \alpha$ as well as estrogens. The increasing concentration of both these agents although is to prime the uterus increasing its sensitivity to analogous oxytocin. Whether a similar mechanism is applicable to human remains to be defined.

Rubber Catheter

A plain rubber catheter for inducing abortion in the 2nd trimester via the extraamniotic route was carried out in 20 patients. The success rate was found to be 90%. The mean induction abortion interval was found to be 31 hrs. 10 min. and in 88.5% of cases the abortion was found to be complete. The complications were also comparatively few.

In the series of J. Misra (1981) the success rate was found to be 100%. 32% of the patients were found to have aborted within 24 hrs. Maximum number that is 55% cases in her series aborted within 24-36 hrs. and all the patients aborted within 72 hrs.

The mode of action of Catheter is mechanical irritation of the uterus leading to myometrial contractions stimulating labour pains. It is also presumed that Catheters

partly separated the membranes also to augment the abortion process. The myogenic nature of uterine contraction has also been reported.

The review of radiological examinations in 64 cases of J.Misra series revealed that the catheter which was pushed up to fundus of the uterus and coiling occurred at fundus led to more efficient uterine contractions. 28 out of 32 cases aborted within 24 hrs. In 5 cases abortion was incomplete and evacuation had to be done. The abortion was complete in the rest of the cases.

By and large the method is safe and effective for treatment of midtrimester pregnancy. Moreover the method can be safely used in medical disorders complicating pregnancy. The technique is simple and can be practised safely in rural area.

As a midtrimester abortifacient intraamniotic instillation of distilled water has been found to be comparatively safe, cheap and with less side effects. Its mode of action is believed to be by mechanical stimulation of uterine muscle to contract. In the present series it was tried on 20 patients and the results were found to be quite satisfactory. The success rate was 86.7 % and induction abortion interval 47 hours 36 min. The success rate in the present series was found to be a little higher that of Rastogi, K. et al (1981) which was 83 %.

In their series the amount of distilled water that was instilled had no relation with the period of gestation, but had a very significant relation to outcome. The procedure was 100% effective when more than 100 c.c of distilled water was injected. In his series 45% cases aborted in 48-72 hrs, 40% cases aborted in 72-96 hours, 15% aborted within 24 - 48 hours. The complicators reported excessive bleeding due to cervical tear, 1 case (1%) pyrexia in 5 cases (5%), amniotic fluid embolism with mortality 1% retained placenta 5%.

In spite of its safety and low cost the method has not gained much popularity probably because of its lengthy induction abortion interval. It may however be useful to some extent if used in conjunction with spartan sulphate as has been done in the present series.

Intraamniotic PGF₂ was given in 20 cases. Success rate was found to be 90%. Induction abortion interval was 22 hrs. 29 min. and 70% of the cases within 24 hrs. However, it showed highest complication rate. In the present series complete abortion rate was seen in 77.77%.

**Results of Intraamniotic Carboprost as seen by
Various authors**

<u>Aruna Sethi</u>	<u>PGF₂α</u>			<u>15 ml. F₂</u>	
		No.	%	No.	%
Success	46	93.9		50	98
Failure	3	6.1%		1	2
Complete	35	76.1%		36	72%
Incomplete	11	23.9		14	28
I.A.I (Mean)	19.8 hrs.				20.4 hrs

Present Series

Success	18	90
Failure	2	10
Complete	14	77.7
Incomplete	4	22.2
I.A.I (Mean)	22 hrs. 29 min.	

The result of the present series are consistent with the results of Aruna Sethi et al (1979).

M.Mukherji et al (1971) tried prostaglandins in 124 cases. In 30 cases intraamniotic instillation was done. In 15 cases PGF₂α was given in a single dose of 1.5 mgm of 15 (α) 15 methyl PGF₂α was given in a single dose. Out of these 30 cases the success rate was 99.33% as 29 cases aborted within 28 hours.

one case aborted after 135 hours of injection following syntocinon drip and another required abdominal hysterotomy due to organic stenosis of cervix and tonic contractions of the uterus. Out of the 94 cases who were given extraamniotic injection of prostaglandins. The induction abortion interval was less than 36 hours in 64 cases (68.08%). Five cases aborted successfully after a second injection. Ten cases who failed to abort within 48 hrs. of extraamniotic injection aborted after syntocinon.

In 5 cases who failed to abort after extraamniotic injection of prostaglandin, hysterotomy alongwith tubectomy was done as they had completed their families. In the remaining 5 cases out of 94 who failed to abort preg. was terminated by ^{at} dilation and evacuation. The remaining 10 cases aborted spontaneously within 105 hours after a single dose. It was thus observed that induction abortion interval was more than when the duration of preg. was less. Induction abortion interval was usually more in nulliparous women compared to multiparous women.

The incidence of incomplete expulsion of placenta and blood loss was more in early pregnancy compared to late pregnancy. Majority required removal of retained placenta. The commonest complication was vomiting and diarrhoea which were soon controlled. One out of 124 cases developed severe anaphylactic shock and was revived with difficulty.

One of 124 died due to uncontrollable haemorrhage because of failure of blood coagulation. Thus giving a mortality level of 0.8%.

Extraamniotic instillation of Ethacridine lactate was carried out in 45 cases. The results were observed to be as follows. Out of 45 cases 44 aborted. The success rate was 97.8%. 20% patients aborted within 24 hrs. The mean induction abortion interval was 34 hours, 14 min.

In the series of Rastogi et al (1981) in 88% cases uterine contractions started in 24 hrs, and in rest 12% cases within 48 hours and 16% cases aborted within 72 hours and 16% cases took 96 hours to abort. Thus success rate was 96% with a failure of 4%. Re-instillation was not done in any case.

In Nahmiskis (1971) series contractions started in 4-8 hours and majority of patients aborted in a period of 24 hours, after injecting the solution. In case of failure a second injection was done, the next day or after 2 days together with oxytocin drip 95% of his patients aborted in 20-24 hours.

Anjaneyulu et al (1977) reported that 81.4% aborted within 72 hours after first instillation. They used unitocin (Spartium Sulphate 150 mg I/M) 1 hourly for 3 doses to assist the process of expulsion.

In the series of Gupta et al (1977) the success rate with emoredil was 28% in 48 hours and total 92% in 72 hours and method failure was 4% with emoredil success rate was high complication rate was less. In 12% cases sponge evacuation was done after abortion and 4% cases complained of abdominal pain. Tenderness was noted on examination which subsided after analgesics. There was no other complication seen. In the Soviet Union as quoted from Rastogi K et al, 1981) Pytel and associates (1968) reported 5 cases of acute renal failure, 4 of which were of a temporary nature. However, very large volume of rivanol were used in these cases (500-700 ml. of a 0.1% solution). In Japan on the otherhand no serious complications have been observed in spite of many years of complications of rivanol, however the volume used in that country were no more than 30-100 c.c of 0.1% solutions. Nabriski (1971) reported 2 cases of cervical tear in his series and 20% cases needed curettage. Gupta et al (1977) reported 18.2% incomplete abortions in emoredil group.

Bharti et al (1981) in her series of 200 cases terminated by macredil, 20% saline and normal saline found that success rate was 100% with macredil, 90% with 20% saline and 68% with normal saline. Complete abortion was seen in 84 cases out of 100 in macredil group, 18 out of 50 in 20% saline group and 2 out of 50 in normal saline group.

Induction abortion interval was as follows

Method	24 hrs.	48 hrs.	72	72	Re. instillation
Unacredil	44	28	14	8	6
Hypertonic saline 2		41	5	-	2
Normal saline	0	6	10	16	18

The various complications seen in the unacredil series were rise of temp. upto 39°C in 24% cases, which settled of its own within 6 to 8 hours without any therapy. Incidence of incomplete abortion was 10% requiring evacuation. Due to spontaneous and sudden expalliation of foetus survival tear were seen in two cases only. There were no serious complications in either unacredil or saline instillation series.

Unacredil is said to have following mode of action.

1. Mechanical stimulation of the uterus and extensive detachment of the membranes. Nanabe (1962) as quoted from Bharti, P. 1981 A.
2. Reflex release of oxytocin from the posterior pituitary (Nanabe 1967 as quoted from Bharti, P. 1981).
3. Increased oxytocin sensitivity observed of the uterine musculature by its direct action. Nishimura and Nanabe (1967).
4. Direct oxytocic effect in the uterine muscle, (Lewis et al., 1971).
5. Decidual damage leading to release of hydrolytic enzymes causing liberation of prostaglandins precursors resulting in abortion.

It does not cause fall in urinary estradiol pregnant dic excretion Nanabe (1969). The foetus is usually born alive as compared to cases of hypertonic saline which causes foetal death by desiccation.

The histopathological study of the placenta and decidua in the present series has revealed some relevant findings. Though normal on external appearance in majority microscopic abnormalities of varying degrees were found in almost all placentae. The findings are the present series are consistent with those of Bengtsson and Stormby (1962) and Salhan Sudha (1979). Klopper et al (1966) also found a bulk of placenta normal but for superficial coagulative necrosis.

Chrisite et al (1966) observed oedematous membrane in all and a thin irregular zone of red thromboses in 5 out of 7 placentae of hypertonic saline abortions. On microscopic examination, Christie et al (1966) found that histopathological abnormalities were confined to thrombotic zone and in the amion. Remaining part of the placentae was normal. No abnormality was seen in the vessels.

Chrisite et al (1966) considered that the changes in the placentae resulted from direct or chemical or osmotic damage to the amion and the subjacent zone of chorionic villi, and that the intervillous thrombosis and polymorphonuclear leucocytic infiltration are a reaction to the necrotic tissue. It is highly probable that the histological changes could have resulted from infection, since there was no classical evidence of chorioamnionitis like that as was seen in 2 patients with intrauterine infection. Furthermore there was little difference in the severity of the changes between the placentae removed by hysterotomy fix 4 hours after injection and the other midpregnancy placenta the delivered vaginally 28-48 hrs after injection.

Bengtsson and stormby (1962) have claimed without any attempt at quantitation that intraamniotic injection of hypertonic saline results in extensive damage to the placenta, and they have suggested that this will cause rapid decrease in placental hormone production and be followed by a decrease in urinary excretion of placental hormones and metabolites. However,

Christie et al (1966) measured the extent of damage seen in the conventional histological preparations and found that the greater part of the placenta was unaffected by the intraamniotic injection. In their immunofluorescent studies they have shown that the placental antigen apparently associated with steroid synthesis are present in the cytoplasm of all the apparently undamaged syncytio trophoblast. These findings suggest that greater parts of the placenta was unaffected by the intraamniotic injection. These findings suggested that the greater part of the placenta will continue its endocrine function. Klopper et al (1966) have measured the urinary excretion of estriol and pregnandiol in consecutive 4 hourly collections before the hypertonic saline injection, during injection, abortion interval and after abortion. After the injection is estriol excretion fall sharply to 60% of its previous levels but pregnandiol excretion was maintained at 80% of the preinjection level, until after the placenta was delivered, when it also fell. This suggests that the intraamniotic injection of the hypertonic injection of the saline causes fetal death so that estriol excretion falls, but leaves the placenta alive and functioning, so that pregnandiol excretion is largely maintained. The studies of christie et al (1966) have shown that intraamniotic injection of hypertonic saline does not cause abortion by causing extensive placental necrosis and furthermore the immunofluorescent studies do not provide any evidence of interference with the function of undamaged part of placenta.

characteristic changes were seen by Christie et al (1966) in the placenta and membranes when labour had been induced by intraamniotic injection of hypertonic saline.

The amnion was edematous and showed widespread necrosis. The placenta showed a thin layer of red thrombus in the subamniotic part of the intervillous space, in relation to chorionic villi which showed cytopathic changes or necrosis of the syncytial trophoblast.

A decorative border consisting of a repeating pattern of small, stylized floral or star-like motifs arranged in a grid-like fashion.

C O N C L U S I O N S

CONCLUSIONS

On close scrutiny of the observations and results of this work, the following inference has been drawn.

Total 245 cases were studied in the present series. There were divided into 3 groups.

Group I - For Mysterectomy

Group II - For intraamniotic devices

Group III - For extraamniotic devices.

It was observed that the majority of cases admitted for termination belonged to unmarried group.

Group I.

- 45 cases belonged to this group.

The complications encountered in the series were excessive bleeding and infection. A case required blood transfusion.

- There was one death in this small series due to transfusion reaction.
- Follow up of cases was not carried beyond three weeks hence the integrity of the scar could not be judged.

Group II

In this series 5 methods were used.

Method I - 1/4 Hyperonic saline

Method II - 40% urea

Method III - Distilled water

Method IV - Efoexin

Method V - Carboprost tromethamine

- The mean induction abortion interval with method (I) was 24 hrs. 24 min. with method (II) was 31 hours 18 min. with method (III) was 47 hrs. 36 min., with method (IV) was 49 hrs. 56 min. and with method (V) was 22 hrs. 29 min.

Thus the smallest induction abortion interval was observed with carboprost tromethamine and the next in the series was hypertonic saline.

- The success rate with saline was 97.8% with urea 100%, with distilled water 86.7% with carboprost 90%, with efcorlin 80%.

Urea showed a hundred percent success rate and close in the line was intraamniotic saline which showed a success rate of 97.8%. The success rate within 24 hrs. was 68.9% with saline 40% with urea, 70% with carboprost. None of the case in distilled water and efcorlin group aborted within 24 hours. The hypertonic saline and carboprost showed almost equal success rate within 24 hrs.

- Complete abortion was seen in 90.9% of cases of saline group, 85% in urea group, 81.4% in efcorlin group, 77.77% in Carboprost group and 84.6% in distilled water group. Saline showed a highest rate of complete abortion.

The complications observed in the series were as follows. In the saline group complained of nausea and 2 of vomiting and a blood loss of more than 300 ml. was seen in 3 patients. In one case amniotic fluid embolism was presumed. In efcorlin group, there was blood loss of more than 300 ml. in one and a temp. rise of 38° F in one. In carboprost group, 3 patients complained of nausea, 7 of vomiting and 5 of diarrhoea. In 3 cases, a fall in B.P. was observed in 3 cases and temp. rise in one and blood loss of more than 300 ml. was seen in one.

In distilled water, group in 4 pts. temp. rise above $38^{\circ}F$ was seen and in 2 patients a blood loss of more than 300 ml. was seen. In urea group, one patient complained of discharge. Only 5 cases were readmitted for bleeding retained products and sepsis.

- No definite conclusion as to the rate of individual complications should be made as the series was small. Yet overall results show that complications with Carboprost were much more than the other group. The complications with distilled water and eforlin were relatively less follow up of cases revealed normal pelvic examination in all cases.

Extraamniotic Group

Two methods were used.

Method I - Extraamniotic emoredil dye

Method II - Extraamniotic rubber catheter.

The induction abortion interval was round to be 31 hrs. 10 min. with extraamniotic Catheter and 34 hrs. 14 min. with emoredil.

The Success rate with catheter was 90% and with emoredil was 97.8%.

- The success rate within 24 hrs. was 30% with Catheter and 20% with emoredil.

- Complete abortion rate was 88.8% with Catheter and 97.7% with emoredil.

- In catheter group a rise of temp. above $38^{\circ}F$ was seen in one patient with no other complication. In emoredil group, 2 pts. complained of fever and 2 of abortal bleeding.

Mistopathology of placenta was carried out in 12 cases, 6 each belonging to hypertonic intraamniotic saline and extraamniotic emcredil group. The lesions observed included coagulative necrosis, of the cytoplasm nucle or pyknosis and disquamation of epithelium. It also included stromal oedema degenerative changes. Dilatation congestion and thrombus formation was observed in blood vessels. Intravillous haemorrhages, fibrin deposits coagulative necrosis, hyaline degeneration and leucocytic infiltration was observed. In subchorionic zone oedema and thromboses was also observed in cases.

No definite conclusion can be drawn from the above data as the series is very small. But on an average it was seen that the placental lesions were much more common with hypertonic saline than with emcredil dye. and the fetuses born in the saline group were nearly always dead and those due to emredyl showed usually live birth.

2222222222222222
2222222222222222

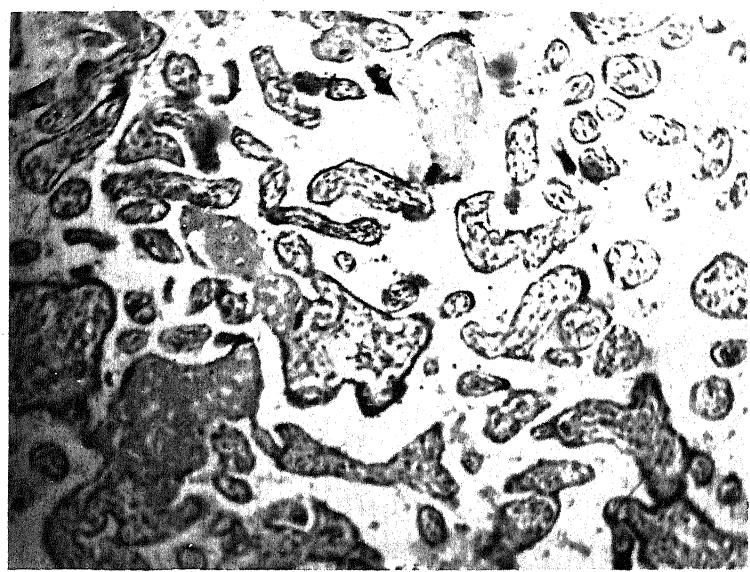


Fig. no.1. Showing degeneration of villi.
(H&E, 70X).

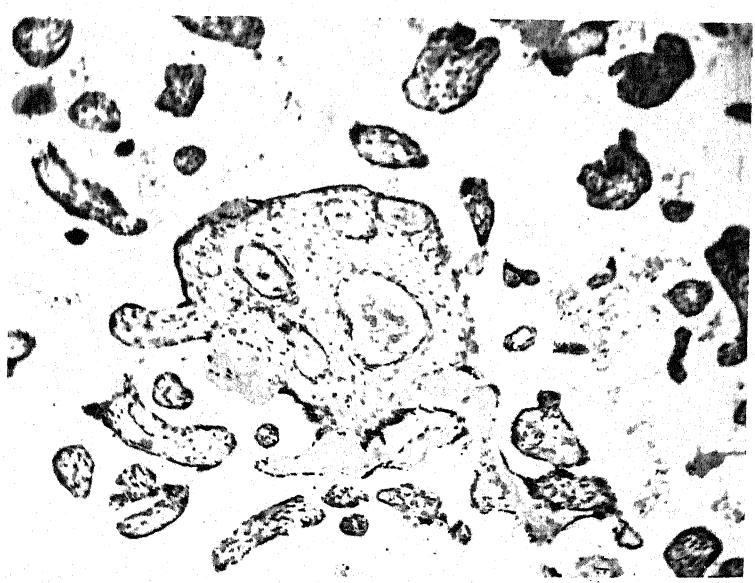


Fig. no.2. Showing inter villous haemorrhages
and congestion of vessels.
(H&E, 70X).

B I B L I O G R A P H Y

BIBLIOGRAPHY

1. Agarwal, S. and Bash, S.K. : Termination of midpregnancy with hypertonic saline . A safe procedure. *J. Obstet. Gynae. Ind.* 29 : 784, 1979.
2. Anjaneyulu , R. , Devi, S. P. and Kanwar, D.S. : Extraamniotic injection of ethacridine lactate (unacredil) for termination of pregnancy in second trimester. *J. Obstet. Gynae. Ind.* 27 : 30 1979.
3. Alpern, N.H., Charles, A.G. and Freedman, E.A. : Hypertonic solutions for termination of pregnancy . *Amer. J. Obstet. Gynae.* 100 : 250, 1968.
4. Bangtsson, L.P. and Csapo A.I. : Oxytocin response withdrawal and re-inforcement of defense mechanism of the human uterus at mid pregnancy . *Am. J. Obstet. Gynae.* 83: 1083, 1964.
5. Bangtsson, L.P. and Strömby, N. : The effect of intraamniotic injection of hypertonic sodium chloride in human mid pregnancy *Acta Obst. Gynae. Scand.* 41 : 115, 1962.
6. Bharti .P. and Mehra.S. : Comparative study of midtrimester abortion with unacredil hypertonic saline and normal saline. *J. Obstet. Gynae. Ind.* 31: 380-1981.
7. Brossat, A. : The induction of therapeutic abortion by means of hypertonic glucose solution injected into amniotic sac *Acta Obstetrica et Gynaecological Scandinavika* 37: 519 1958.
8. Burnett, L.S., King ,T.M., Atienza,M.P., and Bell ,W.R. : Intraamniotic urea as a midtrimester abortifacient, clinical results and serum and urinary changes, *Am. J. Obst. Gynae.* 121 : 7, 1975.
9. Bygdeman , M., Kwon, S and Miquist.M., : The effect of progestron E₁ , on human pregnant myometrium in view . *Prostaglandins*, 1967.

10. Bygdeman, M. and Niquist, N. : Early abortions in the human. *Ann. N.Y. Acad. Sci.* 190 : 478, 1971.
11. Bygdeman, M., Niquist, N. and Toppazada, M. : Induction of mid trimester abortion intraamniotic administration of prostaglandin F_2 . *Acta Physiol. Scand.* 82 : 415, 1971.
12. Cameron, J.M. and Dayan, A.D. : Association of brain damage with therapeutic abortion induced by amniotic fluid replacement. *Brit. Med. J.* 1: 1010, 1966.
13. Carl, A.I. : Legal abortion by extraamniotic instillation of rivanol in combination with rubber catheter insertion into the uterus after the 12th weeks of pregnancy. *Amer. J. Obstet. Gynae.* 115 : 211, 1973.
14. Chrisite, J.L. Anderson, A.B. M., Turnbull, A.C. and Back, J.S. : The human placenta and membranes : A histological and immunofluorescent study of the effect of intraamniotic injection of hypertonic saline. *J. Obst. Gynae. Brit. C'Nch.* 73 : 399, 1966.
15. Clow, W.M. and Crompton, A.C. : The wounded uterus & Pregnancy after hysterectomy. *Brit. Med. J.* 2:321, 1973.
16. Craft, I. , Brummer, V. and Day, J. : Proceedings of 3rd study group of royal college of obstetricians and gynaecologists, U.K. 1975 : 6.
17. Craft, I. and Musa, B. : Induction of midtrimester abortion by intraamniotic urea and intravenous oxytocin. *Janett Sc* 1058., 1971.
18. Ceape, A.I. : Extraovular pressure : Its diagnosis value year book Obst. Gynaecol, 137, 1966.
19. Ceape, A.I., Sauvage, J.P. and Mest, N.G. : The relationship between progesterone uterine volume , intrauterine pressure, and clinical progress in hypertonic saline induced abortion. *Amer. J. Obst. Gynae.* 108:950, 1970.

20. Bahrey, M. : PGF compounds for induction of labour and abortion. Annal N.Y. Acad. Sci. 180: 158, 1971.
21. Bahrey, M.P. : Induction of abortion by prostaglandins E_1 and E_2 . Brit. Med. J. 2: 252, 1970.
22. Bahrey, M.P. : Induction of labour with prostaglandins E_1 and E_2 . Brit. Med. J. 2: 256, 1970.
23. Gillespie, A. : Use of prostaglandins for induction of abortion and labour. Ann. N.Y. Acad. Sci. 180 : 524, 1971.
24. Greenhalf, J.O. and Diggory, P.L.C. : Induction of therapeutic abortion by intraamniotic injection of urea. Brit. Med. J. 1: 28, 1971.
25. Gupta H.D., Kanar, M. and Chanda, C.K. : A study of medical termination of pregnancy (6071 cases) J. Obstet. Gynae. Ind. 27 : 637, 1977.
26. Gustavie, B. and Brunk, U. : A histological study of effect on the placenta of intraamniotically injected and extraamniotically injected hypertonic saline in the therapeutic abortions. Acta. Obstet. Gynae. Scand. 51: 121, 1971.
27. Gustavie, B. : Sweeping of the foetal membranes by a physiologic saline solution effect on decidual cells . 120: 531, 1974.
28. Gustavie, B. and Green .K.: Release of prostaglandin F_2 following injection of hypertonic saline for therapeutic abortion . a preliminary study. Amer. J. Obst. Gynae. 121: 563, 1975.
29. Jaffin, M., Kerenye, T. and Wood, E.G. : Termination of missed abortion and the induction of labour in midtrimester of pregnancy. Amer. J. Obstet. Gynae. 84:602, 1962.
30. Karim, S. M.M. and Pilshias, G.M. : Therapeutic abortion using prostaglandin F_2 . Lancet 1: 157, 1970 .

31. Karim, S.M.M. and Pilshie, G.M. : Use of prostaglandin E₁ for therapeutic abortion. *Brit. Med. J.* 3: 198, 1970.
32. Karim, S.M.M. and Millier, K : Prostaglandins and x spontaneous abortion, *J. Obstet. Gynae. Brit. Cwth.* 77: 200, 1970.
33. Karim S.M.M. : Action of prostaglandin in the pregnant woman, *ANN. N. Y. Acad. Scie.* 180 : 433, 1971.
34. Kauffman, R.G., Freeman, R.K and Mishell, D.R.Jr. : Abortifacient activity of intravenously administered prostaglandins . *Contraception* 3: 121, 1971.
35. Karenye, T.D. : Mandelman, N. and Shirman, D.M. : Five thousand consecutive saline induction . *Amer. J. Obstet. Gynae.* 116: 593, 1973.
36. Clepper, A.I. Turnbull, A.C. and Anderson A.B.M. : Changes in steroid hormone excretion during abortion in midpregnancy by intraamniotic injection of hypertonic saline. *J. Obstet. Gynae. Brit. Cwth.* 73: 390, 1966.
37. Kochhar, M. and Bhatia, P. : Intraamniotic urea for midtrimester abortion. *J. Obstet. Gynae. Ind.* 31: 33 1981.
38. Irenson, N.H. and Schulman, J.D. : Oxytocin administration in midtrimester saline abortion . *Amer. J. Obstet. Gynae.* 115: 420, 1973.
39. Lewis, B.V., and Pylysa, A. and Stilwell, J.W. : The oxytocic effect of acridine dyes and their use in terminating mid trimester pregnancy. *J. Obstet. Gynae. Brit. Cwth.* 78 : 838, 2 1971.
40. Moggins, G.C. , Grieves, S.A., Kendall, J.Z. and Knox, B.S. : The physiological roles of progesterone, Estradiol, 17-B and prostaglandins P₂ alpha , in the control of ovine parturition. *J. Reprod. Fertility, (supple)* 16: 85, 1972.

41. Llewellyn-Johns, B., Clarks, A. and Shutt, D. : A mode of action of hypertonic saline in Inducing abortion. 121: 568, 1975.
42. Mackenzif, I.Z. Lynda, S. : Coagulation changes during second trimester abortion induced by intraamniotic prostaglandin E₂ and hypertonic solution. Lancet, 1: 1066, 1975.
43. Manabe, Y. : Artificial abortion at midpregnancy by mechanically stimulation of the uterus. Amer. J. Obst. Gynae., 105: 132, 1969.
44. Manabe, Y., : Abortion in midpregnancy by extraovular instillation of rivanol solution correlative with placental function. Amer. J. Obst. Gynae. 103:232, 1969
45. Metti, J.K.G. , Morrochia, D.F. and Bramley, P.S. : Induction of labour in sheep and in humans by single doses of corticosteroids. Brit. Med. J. 2: 149, 1973.
46. Misra, J. and Jha, R.K. : Role of extraamniotic rubber catheter in midtrimester pregnancy. J. Obstet. Gynae. Ind. 31: 575, 1981.
47. Mukherjee, M., Shukla, P. and Rohtagi, P. : A trial of intraamniotic and extraamniotic prostaglandins for medical termination of pregnancy. J. Obstet. & Gynae. 29:32, 1979.
48. Murphy, B.E.P. : Does the human foetal adrenal play a role in parturition. 7. Am. Obst. Gynae. 115:521, 1973.
49. Mayers, R.E., Synchyh, P. Ster auss, L. Connas, A., Piquero-a-Longa, J. K. erne yi. t. and Adamson, K. Morphologic changes of uterine wall following intraamniotic injection of hypertonic saline Rhesusmonkey. Amer. J. Obstet. Gynae. 119: 877, 1974.

50. Nahmias, S.A., Kalmanovitch, K., Lebel, R. and Bodman K. : Extraamniotic ovarian transcoelical injection of rivanol for interruption of pregnancy . 110: 55, 1971.

51. Nishimiura, T. and Manabe, Y. : Oxytocin sensitivity and effect of oestrogens and progesterone on metocurine induced abortions at mid pregnancy Am. J. Obstet & Gynae. 98: 1089, 1967.

52. Nwosu, U.C., Mallach, E.E. Bolognese, J. and Ronald : Initiation of labour by intraamniotic cortisol instillation in prolonged human pregnancy . Obstetrics and Gynae. 47 : 137 , 1976.

53. Parikh, M.N. : Termination of midtrimester pregnancy by intraamniotic injection of eferolin : J. Obstet. Gynae. India. 28: 213, 1978.

54. Puumala, P.H., Burnett, L.E., Blake, D.A., Miyasaki, B.C. and King, T.M. : The possible deleterious effect of the intramyo- metrial injection of hypertonic urea Obstet. & Gynae. 47: 210, 1976.

55. Pathak, U.N. : Induction of labour by intraamniotic injection of saline. Am.J.Obstet.Gynae. 101: 513, 1968.

56. Rajjan, R. and Neha K .R. : A combined technique of artificial abortion of pregnancy 29: 799, 1979.

57. Rand, H.R., Balsdon, M.J. and Collins, J.A. : Serum human chorionic gonadotrophin human chorionic somatomammotropin and progesterone following intraamniotic injection of hypertonic urea. Am.J.Obstet and Gynae. 113: 857, 1972.

58. Rastogi, K., Tandon, S. , Singh, V.K. Singh, S.N. Varma, P. : Intraamniotic injection of distilled water for the termination of pregnancy .J.Obstet. Gynae. Ind. 31: 36, 1981.

59. Rastogi, K., Tandon, S., Singh, V. K. and Singh S.N.: Extraamniotic injection of ethacredin lactate for termination of pregnancy in second trimester 31: 26, 1979.

60. Roth-Brandel, U. B. Bydgesen, M., Niquist, N. and Birgstrom, S: Prostaglandins for induction of therapeutic abortion. 1: 191, 1970.

61. Roth Brandel, U. and Adarne, M. : An evaluation of the possible use of prostaglandins E_1 & E_2 and P_2 alpha for the induction of labour. Acta. Obstet. Gynaecol. Scan. 49: 9, 1970.

62. Russel, A. J. and Newlett, P.M. : A hystero graphic study of the abdominal hysterectomy scar. J. Obstet. Gynaec. Brit. Cwlth. 76: 721, 1969.

63. Ruttnec, B. : Termination of midtrimester of pregnancy by transvaginal intraamniotic injection of hypertonic saline. Obstet. Gynaec. 28: 601, 1966.

64. Salhan, S.A., Dube, S. and Mehrotra, M.L. : Histopathological study of placenta and decidua in mid trimester abortions. J. Obstet. & Gynaec. Ind. 29: 811, 1979.

65. Sethim, A. and Jainavalia, S.P. : Termination of second trimester pregnancy which intraamniotic and extraamniotic in instillation of prostaglandin P_2 alpha and 15 methyl prostaglandin P_2 . Jour. Obstet. India. 29: 274, 1979.

66. Smith, R.J. and Newton, J. : A double blind study of intraamniotic urea and hypertonic saline for therapeutic abortion. J. Obstet. & gynaec. Brit. Cwlth. 8: 135, 1973.

67. Vassilatos, P., Wyss, R. and Stecky, J. : Decidual changes during hypertonic saline induced abortion. Am. J. Obst. and Gynaec. 119: 889, 1974.

68. Nagastuma, T. : Intramniotic injection of saline for therapeutic purpose. Am. J. Obstet. Gynae. 93: 743, 1964.

69. Wagner, G., Karker, H., Fuchs, F. and Bengtson, L.P.: Induction of abortion by ocular instillation of hypertonic saline saline. Danish. Med. Bull. 9: 137, 1962.

70. Niquist, N. and Byggman, N. : Therapeutic abortion by local administration of prostaglandin. Lancet. 1:889, 1970.

71. Niquist, N. Byggman, N. Kwan, S.N. Mukherjee, T. and Roth Brandil, U. Effect of prostaglandin E₁ on the midpregnancy human uterus. Am. J. Obstet. Gynae. 102: 327, 1968.

72. Niquist, N and Byggman, N. : Therapeutic abortion by local administration of prostaglandins. Lancet, 2: 216, 1971.

73. Mengold, A.B., Saigel, S. and Stone, M.L. : Intramniotic hypertonic solution for labour. Obst. Gynae. 26: 622, 1975.

74. Wood, C.L., Broth, R.T and Pinkerton, J.H.M., : Induction of labour by intramniotic injection of hypertonic glucose solution. Brit. Med. J. 2: 706, 1962.

